

CHICAGO SHOW

FOR SALE AT ALL NEWS STANDS

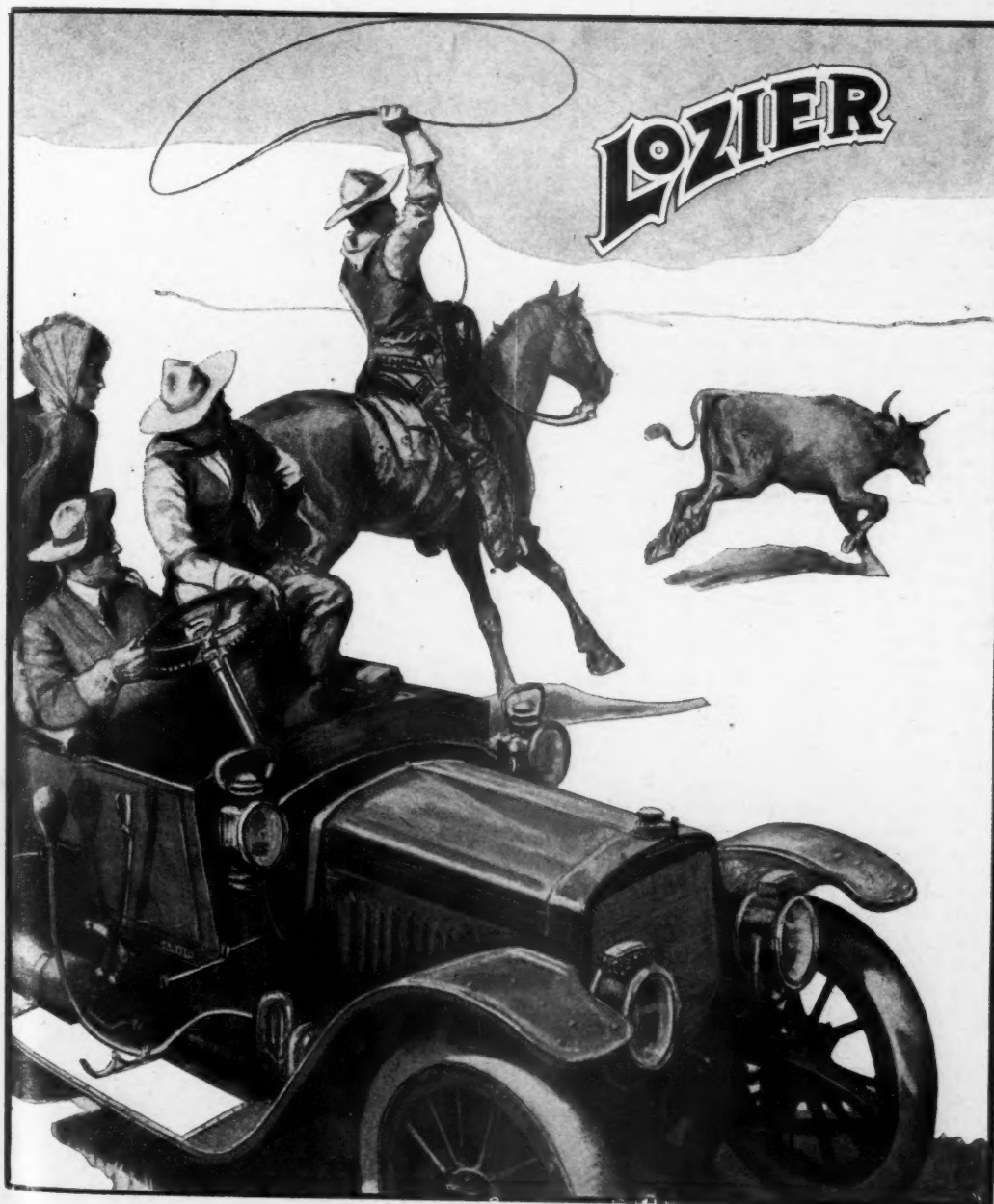
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MOTOR AGE

VOLUME XXI

CHICAGO, JANUARY 25, 1912

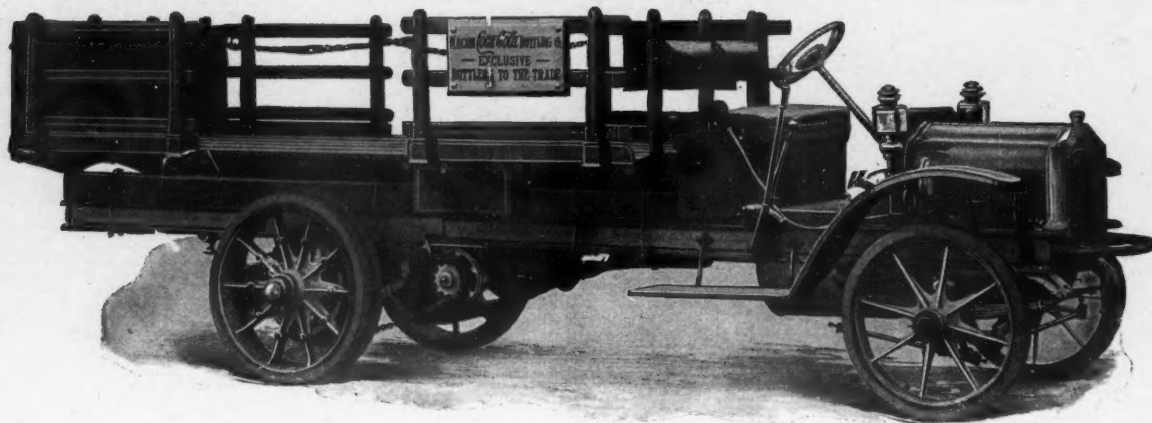
NUMBER 4



No better motor car is made anywhere. The Lozier gives real service in all parts of the world, but it is especially adapted to the long distances of our great West.

LOZIER MOTOR COMPANY, P. O. BOX 719 DETROIT

The agency for the Lozier is a valuable asset



The Lesson of the Year

ANOTHER year has completed its cycle—the richest in experience with motor trucks that the world has ever known. And now, already the epoch-making “shows” are again claiming the attention of the whole automobile world, trying to visualize the progress which the twelve months have made. This experience and progress must have their lessons for every business which has deliveries to make. Perhaps the most important lesson is the fact that so many hundreds of businesses have found—not that they could use the motor truck—that was always true—but that it means so much to their business in increased service, in increased business, in general effectiveness all along the line. In showing business men this pleasant solution of their delivery problems, no truck has been more prominent or taken a bigger share of the burden than the White.

The Simplest Truck—The White

GREAT as has been the progress of motor trucking during the last year, numerous as have been the new fields tapped by this new method of transportation, motor trucking possibilities are just beginning to be understood, and with each succeeding day the field grows wider and wider until there seems to be no reasonable limit to the houses that can profitably use motor trucks. In this ever widening field, one truck must always hold its own, always be one of the first to be considered. That one is the White, because of the peculiar simplicity of its engine design—of ease of operating its engine and the making of any adjustments which may ever be necessary. Any engine built to-day would pattern after the White, because the designer would want to get all the power possible with the smallest charge of gasoline—in other words, power in its most economical—which means the long-stroke engine. The long-stroke engine, with its cylinders cast en bloc, is the simplest form of high-power motor, allowing an almost complete elimination of the usual paraphernalia that litter the average engine. The White engine is easy to care for and operate, is attractive to the driver, consequently does not discourage him to neglect his work; and this is half the battle. A truck engine with complicated mechanism that takes hours to unravel does not invite a tired driver to investigate the cause of some minor trouble which may very quickly become a major trouble if neglected. Further, the White Trucks are built in such capacities as to take care of all your business, being made in fifteen-hundred delivery wagons, ton-and-a-half, three- and five-ton trucks, with standardized type of engine in all.

Why not submit your delivery problem to us? Let us suggest the size and type of trucks you need. If interested we have testimonials of many in your line of business, which tell you better than we can what you can do with the White truck.

The White  Company

810 East 79th Street, Cleveland, Ohio

MOTOR AGE

What of the Future?



WHAT will the car of the future be? Everybody asks this question. If they do not ask it they think it. The future car will be a rational car—a car that meets the needs of the people who buy cars and the people who use them.

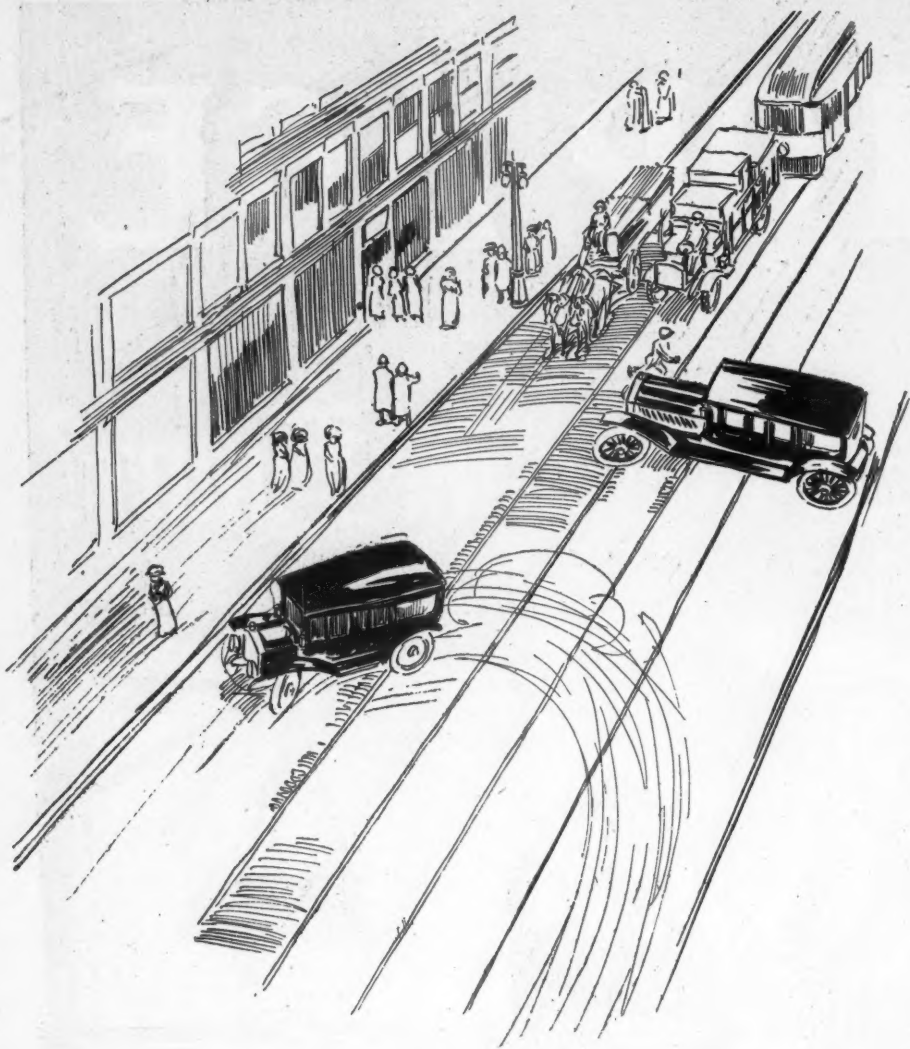
Perhaps the best way to get a clue to what the future car will be like is to look at what we consider the shortcomings of the present car. We all consider shortcomings as those things which do not meet with our present requirements. Often some part of a car is not satisfactory, but we are not prophets or engineers of enough foresight to suggest an improvement. All that we know is that it does not just suit our needs. If we had the ability to immediately correct the shortcomings, the eventual car—the perfected machine—would be but a matter of a few months hence.

One shortcoming of many cars is the in-

ability to turn in city streets without having to back up and go ahead once or twice, thereby blocking traffic. This condition is only met with in the bigger cities with terrific traffic congestion and often narrow streets. The taxicab has made many times more progress in this matter than has the touring car. With the taxi it has been a case of necessity being the father of invention. The owners of taxicab companies had to make money; the great way to do this was to economize in time, as time economy meant gasoline economy, tire economy and pay roll economy as well as increased earning efficiency. The taxicab was designed with steering connections to permit of placing the wheels at angles not dreamed of in a touring car.

What is the result?

Travel by taxicab is many times quicker in big cities than in touring cars. While the touring car is reversing and cramping around, the taxi has made the one turn and is gone before the bigger brother is half way around. Several owners of big cars in New York have discontinued using these cars in the city and have purchased small town cars or use taxicabs. This



THE RATIONAL CAR MUST BE ABLE TO TURN AROUND IN THE BUSINESS STREETS

condition means a reduction in the field of activity of the big car with poor turning facilities.

What is the solution?

Either the big, unwieldy cars will have their fields of operation limited or the makers will improve the turning and maneuvering facilities. It is possible to improve the turning of the cars. When this is done the big car will be more rational. If this is done it will continue to occupy a big place in the city field, if not it will gradually lose out to the smaller and more easily handled vehicles. The small car today is a more rational one.

Comfort of Passengers

Cars must be easier riding.

The spring suspension of them must be improved. This may seem superfluous, but it is not. There are many cars that have poor, very poor, spring suspension. They ride like a cradle on smooth pavement, but go at 20 miles per hour over a street car crossing that is a little high and the rear seat passengers are jolted. Strike a hole on a rough road and they are thrown off the seat. These are the days when everybody is talking touring, talking of getting out into the country and meeting nature face to face. Many women have re-

fused to go touring because of the rough riding of the back seat at speeds of 25 miles per hour. The rational car will have a better suspension. The big reason for the poor body suspension today is that the back seat is often in rear of the axle, it is, in a word, on the long end of the lever. Every time the wheel drops 3 or 4 inches the end of the frame drops much more and the seat is given a like jolt.

How can this be corrected?

The seats will have to be suspended between the axles without making the wheelbase any longer. The way to do this is economizing motor space and pushing the driver alongside the motor on the right or left side. Today it seems to be the thought with makers that they must have a big hood or bonnet. This tendency is not so marked as it was 3 years ago but it still exists. There are several makers who could materially shorten the hood but they are afraid to. They are afraid because they think the car will not look powerful enough. They say the car must look the part; it must give evidence of power or else it cannot be sold. The day of the power craze is passing. This is the day of efficiency and not size. It is no longer a case of greater cylinder bore in order to

get more power. This can be accomplished in a dozen other ways.

In 5 years the hoods will be immeasurably shorter than they are today. In many lines of city cars they will have been entirely eliminated. Eliminating the hood and bringing the back seat forward of the axle will give an easier riding car, will give one that will not skid anything like the cars of today, and will consequently give a car that is easier on tires, and easier on all of its other mechanisms.

Body Reforms Needed

The body of today is far from being a rational body. It is far removed from the eventual. To begin with the chauffeur has 90 per cent of the bargain. The owner who sits in the rear seat is the also ran so far as comfort is concerned. This is scarcely rational. The driver must be made comfortable. It is necessary. In cold weather he wants every control of his hands and feet. He must not go around frozen like the horse driver. He has very much greater duties to perform. The horse driver in a half stiffened condition can hold the reins of an old trusty steed, but the mechanisms of the motor car demand expert control. The machine must be guided with great care for the safety of all. Consequently the driver must be protected. He should be enclosed as in the berline limousine, but it is not necessary to give him a full-width seat. The seat at his left is not used one-tenth of 1 per cent of the time. It had better not be there at all. In its place should be a trunk or suitcase compartment. A space in which some shopping parcels can be carried when milady is in a hurry, a space in which a small trunk can be carried for an emergency run to the depot, a space in which grips can be carried.

This is poor economy.

The rational limousine will not have this 20 per cent waste of the best space in the car. If it is not used for baggage space, then it can be utilized as a single seat facing the rear; and by doing this the rear seat can be carried nearly 2 feet forward, placing it well in advance of the axle and improving the riding qualities more than 100 per cent.

But go a step farther.

The driver will be pushed forward. Over 1 foot of space between the axles will be saved. He will sit to the right or left side of the engine. He will have a comfortable position, and at the opposite side will be tool space for tire tools, jacks and other car parts. This is nothing imaginary. It is already being aimed at in the German factories. It is certain to come. For a few years many traditionalists will talk against it. They will say it cannot be done. They will hold up their hands in holy horror at the thought of mounting the driver alongside the motor. It has been done for nearly 10 years by one European builder and he has the reputation of having the easiest-riding car in all Europe. The car looks all right, too. True

it is a little different from the conventional, but we are constantly getting away from such. If we were not we would still be running out in the muddy street in order to get into the car on the left side.

Question of Steering

Left-hand drive must come.

Many talk against it today. They say it is not dynamic. They say that it is impossible in trucks and so it will result in a mixed system, if left-hand is used in touring cars and right-hand drive in trucks. If the present truck driver cannot get accustomed to left-hand drive he soon will have to. It is the rational city drive, when the car keeps to the right. Every time a driver has to turn a corner to the left he has to see that the street back of him is clear. When he is on the left it means but a turn of the head; when he is on the right it often means slowing up and leaning over to the left. The left-hand drive will come in trucks. The old argument that the horse driver has been used to the right side all his life and cannot change will pass away. The old horse driver has to get used to many other innovations if he is to remain at his post. He must first of all get the twentieth century pace of working, the pace that makes motor trucks profitable. He must learn the new methods of loading and unloading and when he is learning these and many other new and imperative features he will soon get accustomed to driving on the left side.

It is easy to learn.

Many who have never driven on the left imagine it difficult. It is not. Scores, after their first experience, have immediately said that they like it better than on the right. It will not be long before 50 per cent of the cars built in this country will have left-hand control and then what will the doubting Thomases say? It will then be up to them to get into line.

More baggage space must come.

This is an old argument. It has been talked nearly a score of times in these columns. But the makers are coming around to it. They are starting to improve



THE FUTURE CAR WILL HAVE THE SEATS WELL PLACED BETWEEN THE AXLES

the appearance of the cars. Spare tires are being taken off the running boards and placed back of the car. This is but the intermediate step between carrying them on the running board and carrying them under the rear seat, where they are entirely out of sight. The gas tanks are now being housed inside of cylindrical sleeves that partly hide them; some makers are concealing them entirely between the running boards and the frame; some have placed them inside of the frame. Battery boxes have been taken off the running boards and carried in metal cases inside of the frame members. Tool boxes are now hidden.

Rational Outside Appearance.

So the story goes.

With all of this transition already established, it is but a subsequent step until the outside of the car becomes a real rational appearing construction. There will be much improvement in the lamps. The dash lamps will be entirely housed in the dash. The headlights will be greatly reduced in size and eventually made an integral looking part of the body. The fantastic external horns will be hidden.

Then the car certainly will look the part.

The chassis will be refined.

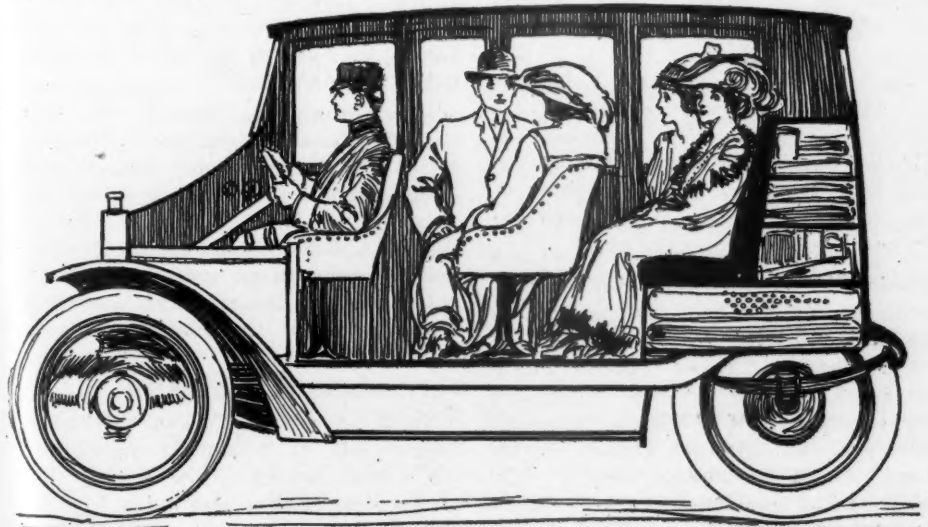
In the medium-priced car there will be a reduction of piston displacement. There will be an increase in the crankshaft speed and this will bring into vogue the four-speed gearset for cars of this type. Motor flexibility will between speed ranges of 1,200 and 2,000 revolutions per minute compensate for gearset changes but for speeds outside of these limits the changes of the four-speed set will be essential.

The winter body is coming.

It is not necessary for the man owning an open touring car in the summer to have a big limousine in the winter in order to make use of his car. A compromise is already coming and the end is not yet. Some years ago we drove without even the glass front or top. Then came the top with its flapping sides. Soon the extension top door was added so you could get in and out without having to climb over the back of the front seat and squeeze out under the side curtains. Today folding types of doors, giving full-top height, are on the market. Special combination tops, giving almost as good comforts as a limousine are in use. These tops are a vast improvement on former types.

A Top Prediction.

But they are costly. This will be reduced and it will be within the province of nearly every car owner to fit some special style of winter top; in fact, many of the car makers will be including these as a part of stock equipment. It is but rational that this should be. The days of buying a car for a few months each year are over. The number of cold-weather tourists is increasing and with the accomplishment of better roads there will be a boom for late fall and early spring touring that the most sanguine never dreamed of. This is rational. What seasons of the year are more inviting than the early days of April, with the flowers peeping through the earth and the closing days of autumn when nature is at her best!



THE SINGLE-COMPARTMENT CAR IS IDEAL FOR EARLY SPRING TOURING

Garden Truck Show Draws Crowds

NEW YORK, Jan. 20—The second annual commercial car show came to a close in Madison Square garden this evening after a run of 1 week, which was a phenomenal week so far as business in the truck industry is concerned. An advertising manager in one of the biggest companies stated that on the opening night of the show his concern had 114 real live prospectives after having weeded out scores of questionable ones. This was a typical example of the real avalanche of business that beset the show on the opening night and continued throughout the week.

The crowds have been good. On opening night over 8,000 attended. Tonight, the close of the show, had over 5,000. Secretary Downs of the show committee estimates the aggregate attendance for the week at approximately 70,000.

The attendance at the show and the nature of the business people making up the attendance was largely to the efforts of the show committee. Chairman George Pope had weeks ahead prepared a list containing approximately 20,000 names of prospective truck users in metropolitan New York. To each person on the list an invitation was directed offering free admission to the show and other facilities for examining the progress made in truck manufacture. Up to Friday night something over 10,000 of these invitations had been heard from and an estimate of today's attendance shows that practically 2,000 more were reported on the last day.

This great body of 12,000 interested, prospective purchasers formed one of the characteristics of the 1912 show. There were no sight-seers among this division. It could be reckoned with certainty that nineteen out of twenty who took the trouble to attend one or more of the sessions were there to make a careful inspection of the truck field as presented, with the idea of installing power-propelled vehicles in their own lines or to replace present equipment, either of horses or earlier types of automobile trucks.

In watching the crowds as they passed from exhibit space to exhibit space it was apparent that they were all looking for something practical. They had come to buy. This was the big difference between the present show and that of a year ago. During the show of last year a big proportion of the crowd came to look. This year it was to purchase. By careful calculation it was ascertained today that over 400 trucks were actually disposed of during the week. The aggregate of sales as reported from the different spaces was away beyond this, but eliminating the exaggerations so common with many salesmen it is believed that 400 is a conservative estimate.

From talks with the different represent-

atives of trucks on exhibition, it was learned this evening that there has been during the week a decrease in the direction of municipal business, owing largely to the fact that fewer models were shown that were specially fitted for fire-department service. This condition is the result of specialization on the part of a few companies and the fact that some of the concerns that have gone deeply into the building of fire-apparatus did not exhibit at the show. The Knox, Pope-Hartford, Saurer and a few others showed various types of apparatus, or chassis suitable for fire department work. In fact there were numerous companies whose standard cars are similar to the general lines required in certain departments of that service.

Some inquiry was received from municipalities for cars suitable to use for street cleaning, garbage and ash removal and for sprinkling. The auxiliaries characteristic of each branch of service were not shown in much variety.

FLANDERS MFG. CO. ELECTION

Detroit, Mich., Jan. 24—The election of officers of the Flanders Mfg. Co. has resulted in the retention of W. E. Flanders as president. A. O. Smith has been succeeded as vice-president by Donald C. McCord, while among the directors are Scott Brown, of South Bend; J. M. Gunn, of New York, and W. M. Baker, J. B. Book and W. Kahmeier, of Detroit.

NEW SELF-STARTER CONCERN

Anderson, Ind., Jan. 22—W. R. Poland, for a number of years identified with the Remy Electric Co., of Anderson, has resigned his position as general manager of that company to take active charge of a concern he has organized for the purpose of manufacturing and marketing a mechanical self-starter for motor cars. The company will be known as the Simplex Mfg. Co. and will be located in Anderson. The product will be styled the Simplex self-starter. Identified with Mr. Poland are W. S. Poling, G. J. Derthinck and James F. Stanley, all of Anderson.

Harry W. Griffith, of Indianapolis, who has been the secretary-treasurer of the Remy Electric Co. since Stoughton A. Fletcher bought the plant last February, has been appointed general manager of the company, vice Mr. Poland, who has resigned.

TRADESMAN COMMITS SUICIDE

Detroit, Mich., Jan. 22—Local motor circles were shocked by news of the tragic death of Thomas Walburn, manufacturing manager of the Studebaker Corporation's E-M-F plants, Saturday morning, when he shot himself in his home at 104 Burlingame avenue. Mr. Walburn had been suffering from stomach trouble for several years. He had consulted the greatest stomach specialists in

Seventy Thousand Attendance and Much Business Done

Thomas Walburn, Studebaker Manufacturing Manager, Commits Suicide

Adams Brothers Co., of Findlay, O., Holds Election of Directors

New Self-Starter Concern Organized in Anderson, Ind.

Marshall Oil Co. Starts Suit Against Atlas Oil Co.

the country without obtaining any relief. His ailment was finally diagnosed as ulcer of the stomach, and he then was beyond hope of recovery. In the Walburn home at the time of the tragedy was E. Leroy Pelletier, advertising manager for the Studebaker Corporation, and his wife, who were staying with the Walburns for a few days on account of Mr. Walburn's condition. Mr. Pelletier has himself been ill with an attack of pneumonia, but his condition is not serious.

Mr. Walburn was 46 years old and was born in New York state. He came to Detroit in 1906 to become factory manager for the Ford Motor Co., leaving that concern to go with the E-M-F Co. when it was organized. No children survive.

ADAMS HAS AN ELECTION

Findlay, O., Jan. 20—Stockholders of the Adams Brothers Co., manufacturer of the Adams truck, have elected the following board of directors: Joseph Kwis, John A. Meeks, Alfred Bloomingdale, W. D. McCaughey, C. H. Bigelow, D. B. Adams and Lyle Adams. W. D. McCaughey was elected general manager and C. H. Bigelow assistant general manager. James T. Adams, Jr., was retained as sales manager. The new regime will take hold of the company the first of February.

OIL COMPANY SUIT

Marshalltown, Ia., Jan. 20—The Marshall Oil Co. announces that it has petitioned the Douglas county district court of Nebraska to recover damages from the Atlas Oil Co., M. A. Hurlburt & Co., and Weston A. Eddy, all of Omaha. The Marshall company alleges that the defendant Atlas company illegally and unlawfully used the brand "French Auto Oil" in marketing its goods.

PATHFINDING IN THE SOUTH

North Augusta, S. C., Jan. 22—Special telegram—D. D. Armstrong, manager of the Atlanta branch of the Touring Club of America, reached here today from Savannah, laying out the route for the Augusta-Nashville reliability tour.

Big Power Wagons Make Good In Tests

**Alco Does 336 Hours in Non-Stop Test;
Decatur's Excellent Performance**

**Mason Company Reorganizes and Will Use
Knight Engine**

**Master Will Take Testimony in Case of
Carhartt Company**

**Answers in Dyer Patent Suits Will Be
Filed in March**

**Coe-Mitchell Company Reorganizes in
Chicago and Gets Plant**

NEW YORK, Jan. 20—A non-motor-stop truck record was established to-day when the 3½-ton Alco truck ended 336 hours of day and night service without the stopping of its motor. This run came to a close at 5 a. m., 14 days after the truck entered non-stop duty for the United States Express Co. It replaced five two-horse teams, and four men accomplished the duties assigned under the old method to ten employees of the express company.

In day time the truck was called upon to deliver in the residential sections of a number of New Jersey cities. In the evenings the duty shifted to transfer of heavy loads between the express company headquarters in Hoboken and the Central Railroad of New Jersey in Communipaw.

Performing such varied duties as these, the vehicle transported on an average of 31,510 pounds of merchandise a day, averaging 66 miles, fourteen trips and 92 stops for collecting and distributing its cargo. The record for miles in a single day was 86, and the largest number of trips was 22. The high mark in stops 104 was made on the first day of the run and on January 17, the truck hauled its heaviest loads totaling 43,978 pounds. An average of 1 gallon of gasoline to an hour of service was maintained.

The total number of miles covered during the 2 weeks of duty was 922. All told, 198 trips and 1,284 stops were made. The entire number of pounds hauled throughout was 441,136.

When the run terminated an examination was made for the first time of the mechanism and it was said that the truck showed no effects of the strenuous test it had been through. It was not found necessary to stop the motor at any period of the run, despite the abnormal conditions to which the truck was subjected.

The record which this truck surpassed was made by an Alco a year ago, when a 3½-ton truck ran on the streets of New York for 6 days and nights and following this performance with a trip overland to

Philadelphia—a total of 168 hours. A month ago another Alco was required to serve the Adams Express Co. for 144 hours without interruption.

TABLE OF STATISTICS

Date	Miles	Trips	Stops	Pounds Hauled
January 6.....	74	13	104	19,000
January 7.....	61	21	90	33,600
January 8.....	59	14	92	31,450
January 9.....	64	12	102	27,425
January 10.....	62	12	92	27,187
January 11.....	67	14	103	36,645
January 12.....	65	13	98	38,890
January 13.....	59	14	89	30,500
January 14.....	86	22	50	19,050
January 15.....	71	13	84	27,500
January 16.....	93	13	95	37,460
January 17.....	70	12	96	43,978
January 18.....	62	13	94	29,660
January 19.....	59	12	95	37,800

Totals.....922 198 1,284 441,136
Run started January 6, 5 a. m.
Run ended January 20, 5 a. m.
Total number of hours in service without motor stopping, 336; former best non-stop motor record, held by Alco, 168 hours.
Largest mileage in a single day, 86. Most trips, 22. Most stops for loading and unloading, 104. Most pounds hauled, 43,978.
Average daily mileage, 66; average daily trips, 14; average daily stops, 92; average daily loads, 31,510.
Total gasoline consumption, 361 gallons.
Horses replaced, 10 (five-horse teams).
Labor cost saved, six men.

MASTER HAS CARHARTT CASE

New York, Jan. 22—The affairs of the Carhartt Auto Co., which has been in bankruptcy in the United States district court for several months, have been referred to a master for testimony, examination and report. The company's assets are making a good showing and creditors now feel that individual losses will not prove of much importance.

REPORT ON DECATUR RUN

New York, Jan. 22—Official figures covering the recent sanctioned non-motor-stop test of a Decatur 1½-ton truck have been tabulated by the contest board of the A. A. A. The run covered 168 hours of running and was observed by three officers of the A. A. A., namely, Messrs. Camacho, Thompson and Hossenlopp. They worked in approximately 8-hour shifts, and it was their duty to record every stop of car or motor and to note every incident out of the ordinary.

The truck covered 1,063 miles on 152 gallons of gasoline and 51½ pints of oil, or about 7 miles to the gallon. Taking only the bare figures, this showing is unfair to the truck, because from about 2 o'clock Thursday, January 11, until 5 o'clock in the afternoon the truck was laid out while a new rear axle was installed. In the darkness of the early morning the truck ran into a pillar of the elevated railroad structure on Ninth avenue and bent back the rear axle so seriously that the car was put out of commission so far as running was concerned. The motor kept going all the time until the repairs were finished, and the engine used up a tankful of gasoline.

Snow or frigid weather was experienced all week with the exception of 1 day. The truck weighed loaded 8,230 pounds at the

start and 7,980 pounds at the finish, 250 pounds having been removed from the load during the run. The empty weight of the truck was 4,920 pounds. Two motor stops were recorded; one of 10 seconds, when the engine stalled entering a garage, and one of 5 seconds when it stalled in front of Grand Central palace. Under the rules, a stoppage or a series of engine stoppages totaling 60 seconds or more would be sufficient to disqualify.

MASON COMPANY REORGANIZES

Waterloo, Ia., Jan. 17—The annual meeting of the stockholders of the Maytag-Mason Automobile Co. was held at the Westfield factory on Tuesday, at which time a complete reorganization of the concern was effected, the name of the organization being changed to the Mason Motor Co. At the same time it was announced the Silent Knight motor will be used on the four-cylinder cars. Further, it was decided that the business of the company will be conducted by a board of three directors, instead of five, the men chosen to the position being H. W. Hayden, W. B. Wallace and E. R. Mason.

An election of officers followed, the stockholders naming Mr. Mason for president, Mr. Hayden for vice-president, and Mr. Wallace for secretary and treasurer. The reorganized concern plans to make from 800 to 1,000 cars this year, three of the models will be two-cylinder pleasure cars and four of them four-cylinders. In addition, a light delivery truck will be manufactured.

MARCH DECISION IN DYER CASE

New York, Jan. 23—Answers on behalf of the defendants in the suit of the Enterprise Automobile Co. against the Maxwell, Winton, Locomobile and Saurer companies were due yesterday in the United States district court, but prior to that time another stipulation between the parties was entered providing for a delay until the first Monday in March. As the day for this important step in the proceedings draws nearer the interest of the industry grows stronger. Both sides express unlimited confidence and the indications are for a fight that will outdo the Selden litigation in breadth and importance. Rumors of possible compromises have been afloat, but neither side will admit that it is responsible for them. One was to the effect that the sum of \$75,000 and a royalty had been tendered to the Dyers by a group of manufacturers. The Dyers would not confirm the rumor and manufacturers could not be located.

In order to test the validity of the Dyer transmission patents prior to the hearing of the cases directed toward four big companies, suit was filed today against Royale H. Fowler, who is alleged to be the owner of a Correja car equipped with

a selective transmission. It is understood that the suit will be defended by Vandewater & Co., makers of the car at Elizabeth, N. J., and before it is concluded it is expected that it will involve some of the highest interests in the industry. According to information derived from the complainants, the defendants expect that the Automobile Board of Trade will take a hand. As the Vandewater company is not a member of that organization, and as the board of trade has no official interest in the particular patents involved, the likelihood of it becoming a party to the suit is remote.

COEY GETS FALCAR PLANT

Chicago, Jan. 23—There has been a reorganization of the Coey-Mitchell Automobile Co. with a capital stock of \$250,000, and plans have been made to secure possession of the plant of the Fal Motor Co., which went into bankruptcy some time ago and which is located at May and Randolph streets this city. C. A. Coey has been elected president of the reorganized company with Charles Little vice-president, Fred Starnes secretary, and Clayton H. Tobias treasurer. It is planned to build 500 cars for 1912 delivery. There will be but one chassis but different kinds of bodies will be offered. The motor will be a six-cylinder with 4-inch bore and 5-inch stroke with 124-inch wheelbase.

CASE BUYS STEPHENSON PLANT

Milwaukee, Wis., Jan. 22—As part of the expansion policy adopted by the J. I. Case Co., of Racine, Wis., which recently increased its capital from \$5,000,000 to \$40,000,000, the Case company has taken over the entire plant of the Stephenson Motor Truck Co., of Milwaukee, manufacturing the Utility and Stephenson light and heavy cars for commercial purposes. The Case company already owns a pleasure car plant, formerly the Pierce Motor Co., of Racine. The deal with the Stephenson concern involves approximately \$500,000. The works are at South Milwaukee and recently have been considerably enlarged.

BADGER TRUCK MAKERS ORGANIZE

Milwaukee, Wis., Jan. 22—Wisconsin manufacturers, agents and dealers in commercial vehicles organized an association at Milwaukee last week and elected Frank Brandecker, of the Kissel Motor Car Co., Hartford, Wis., as president. The organization will be incorporated under the name of Wisconsin Commercial Car Association and its main purpose is to promote the interests of motor trucks in Wisconsin. The other officers are: Vice-president, S. Wollheim, Crown Commercial Car Co., Milwaukee; secretary and treasurer, Carl G. Anderson, Stegeman Motor Co., Milwaukee; directors, D. F. Poyer, Menominee, Mich.; F. L. Cochrane, Packard Motor Car Co., Milwaukee branch; J. C. Devlin, Universal Machinery Co., Milwaukee. It is the first association of its kind in this part of the country. More

Label on Export Goods

than 35 per cent of all commercial cars built west of the Alleghenies are Wisconsin products.

WILL CONTINUE MOTORETTE

Hartford, Conn., Jan. 20—A new concern has been formed to continue the manufacture of the Motorette formerly made by the C. W. Kelsey Mfg. Co., which recently got into financial difficulties. Mr. Kelsey, it is announced, will be with the new company. This concern has secured all the assets, trade-marks and material on hand of the Kelsey company and, in addition to making the standard Motorette, it will bring out a similar vehicle, which will be electrically-driven. Mr. Kelsey announces that the old concern had undelivered orders on its books for 2,558 cars, which it could not turn out because of inability to get parts.

FENDER PATENT SUIT ON

New York, Jan. 23—Special telegram—Emil Grossman is the nominal defendant in a suit now on the equity calendar for the United States district court that was brought on behalf of the owners of the Sugar patent, covering a certain kind of fender used on motor cars. The actual defendant is the Chicago concern which manufactures the fender in question for Mr. Grossman's company. In the proceedings so far it has developed that both parties claim patents covering the product turned out.

HORN CASES MOVE SLOWLY

New York, Jan. 22—The only move of the past week in the electric horn litigation in the United States courts has been some advancement in the suit of Klaxon against Newton. The record shows that on December 20 the complainants offered to close their prima facie proof. The Newton side, however, decided to continue the cross-examination of Edwin H. Hammer, an expert witness for Klaxon. This continued through 13 days and closed on January 13. A motion was made by the defendants to compel further answers by this witness, which was disposed of January 16. Up to January 22, neither taking of testimony nor the fixing of a day for so doing on the part of the defendants had been accomplished. Under the existing stipulation it has been agreed to close the taking of testimony by February 20, so that final hearing may be had before adjournment for summer vacation. The Klaxon suit against Ever Ready and others remains in statu quo.

HAMILTON FEDERAL SALES MANAGER

Milwaukee, Wis., Jan. 22—G. H. Hamilton, formerly sales manager of the G & J Tire Co., and later of the Kokomo Rubber Co., Kokomo, Ind., has severed his connection, formerly sales manager of the G & J, accepted a similar position with the Federal Rubber Mfg. Co., of Milwaukee, Wis.

Bill Introduced into Congress Which Is of Interest to All Manufacturers in Industry

WASHINGTON, D. C., Jan. 23—Special telegram—The motor trade will be deeply interested in the following bill introduced in congress by Representative Campbell:

"That section 1 of an act entitled, an act to regulate commerce, approved February 4, 1887, be amended so as to read as follows:

"Section 1—The provisions of this act shall apply to any person, firm, company or corporation engaged in the production or manufacture of any article or commodity that enters into interstate or foreign commerce. It shall be unlawful for any such person, firm, company or corporation to place upon the market for interstate or foreign commerce any product of manufacture without printing, embossing or stenciling the name and address of the manufacturer upon such article or commodity; it shall be unlawful for any person, firm, company or corporation to erase or change the name of the manufacturer or manufacturers of any article entering into interstate or foreign commerce mentioned in this act.

"Any person or persons, firm, company or corporation offering for sale or rent or otherwise disposing of any property intended for interstate or foreign commerce shall furnish therewith the name and address of the manufacturer or manufacturers of said commodity or article, provided that nothing in this act shall be construed to prohibit such manufacturing firms placing any other name, as dealers', upon articles of manufacture in addition to the name of the manufacturer.

"Any person, firm, company or corporation violating the provision of this act shall be guilty of a misdemeanor and fined in the sum of not exceeding \$1,000 or imprisonment for a period of not exceeding 6 months, or both such fine and imprisonment as the court may direct."

NEW CHICAGO TIRE PLANT

Chicago, Jan. 23—The Dryden Hoof Pad Co., of which George B. Dryden is president, has bought a factory site at Forty-third avenue and the Baltimore and Ohio Chicago terminal transfer railroad tracks, where it is proposed to erect a building containing 60,000 square feet of space which will be devoted to the manufacture of pneumatic tires and solid rubber truck tires. It is expected that about 800 men will be employed and that the capacity of the plant will be 200 tires per day. It is expected that the plant will be in operation some time next summer.

Send Two Bills to Congress

Road Delegates Adopt Two Important Resolutions in Convention Held in Washington

WASHINGTON, D. C., Jan. 2—The net results of the federal aid for good roads convention held here this week were the adoption of two resolutions and the drafting of a bill that congress will be asked to enact into law. One resolution is to the effect that the memory of Abraham Lincoln can best be perpetuated and preserved to posterity by a great national highway and such highway should be constructed by the government. The other resolution put the convention on record as being opposed to any plan suggesting or advising congress how to secure funds to finance any federal aid proposition that might be brought forth. This resolution followed the advocacy by Jesse Taylor, of Ohio, of a plan to put an additional internal revenue tax of 10 per cent on liquors and tobacco, the revenue thus secured to be used in improving the roads of the country.

The bill brought in by the resolutions committee of the convention creates a national highways commission and prescribes its powers and duties. The proposed commission is to investigate, collect information and report to congress on the highways of the United States, together with their recommendations as to the proper policy of the national government in respect thereof, whether by the establishment of a system of national highways or by federal aid in the building of state roads or otherwise, and as to the most appropriate legislation to carry such policy into effect.

The commission is to consist of a chairman and fifteen commissioners known as an advisory council. The chairman and five members of the commission are to be appointed by the president of the United States; five by the senate and five by the house of representatives. The commission is to serve without salaries. The chairman is to have executive charge of the work, subject to the supervision and direction of the advisory council. He is also to prepare and submit to the president of the United States not later than December 1, 1913, a full and detailed report of the work of the commission, of its recommendations and the reasons thereof. The term of office of the commissioners and their successors shall end upon the delivery of their final report to the president, but not later in any event than December 1, 1913.

It is expected this bill will be introduced in congress within the next few days and early action is expected on it.

The convention adjourned Wednesday after four lively sessions, during which many splendid speeches favoring federal aid in good roads work were made by some of the most eminent men in congress, including Speaker Champ Clark, Oscar W. Underwood, the majority leader on the floor of the house, Senators Swanson and Bankhead, Congressmen Sulzer, Byrnes, Hobson, Borland, Linthicum and many others. The convention is sure to give the good roads movement a decided impetus.

CHAIN MEN ANSWER SUIT

New York, Jan. 22—Answer to the suit of the Weed chain company has been filed by the Atlas Chain Co., and the matter will come up for hearing or replication before Judge Lacombe in the United States court on Friday of this week. The answer alleges the defense outlined in Motor Age last week, setting up the two decisions of the federal courts which hold that a loose-fitting chain falling to the ground in front of the wheel by gravity to be no infringement of the Parsons patents. Motor Age last week stated that under the injunction granted by the United States court, prohibiting the manufacture, use or sale of the Atlas chains pending the determination of the existing phase of the matter, the Atlas exhibit had been summarily closed. This was true, but had nothing to do with other products made and displayed by the Atlas company, which were not affected by the terms of the injunction.

RECEIVER FOR EARLY COMPANY

Columbus, O., Jan. 22—Upon the application of John E. Jones, vice-president of the corporation, Charles F. Barndt was named receiver for the Early Motor Car Co., of Columbus, by United States Judge Sater recently. The company until recently has been acting as sales agent for several lines of cars and carried on a business in parts and accessories. Recently the sales agency end was given up, but the parts business was continued. Out of the 159 creditors fifty-nine are Columbus people. The assets listed by the company in the application for receiver shows assets of \$31,192.78 and liabilities of \$67,992.93.

WISCONSIN DEALERS ORGANIZE

Milwaukee, Wis., Jan. 22—The Wisconsin Automobile Dealers' Association was formally organized at a convention of retail dealers held in Milwaukee last week in connection with the show. The officers elected are: President, Nathan Haessly, Theresa, Wis.; vice-president, L. F. Schoelkopf, Madison; secretary and treasurer, M. C. Moore, Milwaukee; directors, Arthur Stuart, South Wayne; L. H. Hall, Wausau; G. M. Rix, Cedarburg; H. B. Webb, Milwaukee; Frank J. Edwards,

Milwaukee. The association starts with a membership of 125. There are approximately 750 dealers in Wisconsin whom the association will try to enlist. The annual meetings will be held during show week in Milwaukee. The main object of the association is to bring the dealers together and bring about a better understanding between manufacturers and dealers, to eliminate appointments of undesirable and illegitimate agencies and to stop cut prices.

REPORT ON ACCIDENTS

Washington, D. C., Jan. 21—Statistics prepared by Dr. C. L. Wickburt, chief statistician of vital statistics of the census bureau, shows that in 1910 there were 48,606 deaths from violence. Motor cars are charged with killing 988 persons, just 1.8 to every 100,000 inhabitants, where in 1909 the count was 1.2. In view of the vast increase in the number of motor cars in between counts, the 1910 results cannot be regarded as an increase.

WILL MAKE LIMA ROADSTER

Lima, O., Jan. 22—Arrangements have been practically completed for the organization of the Lima Motor Co., of Lima, Ohio, with a capital of \$200,000 for the manufacture of a low-priced pleasure car to be called the Lima roadster. A large proportion of the stock has been subscribed. Those who are interested in the project are F. L. Maire, F. W. Holmes, J. E. Grosjean, Henry Mack, W. T. Agerter, Dr. T. K. Jacobs and N. L. Michael.

BADGERS HOLD STATE MEETING

Milwaukee, Wis., Jan. 22—Colonel Frank M. Joyce, of Minneapolis, Minn., first vice-president of the American Automobile Association, was the guest of honor at the annual meeting of the Wisconsin State A. A. on January 18 in Milwaukee. Following the meeting a banquet was tendered to Colonel Joyce by the officers and directors of the W. S. A. A. and the Milwaukee Automobile Club. The election of directors resulted in the following choices: A. J. Horlick, Racine; H. L. Halverson, Whitewater; Faustin Prinz, George A. West, M. C. Moore, James T. Drought, Dr. Louis Fuldner, John W. Tufts, Frank J. Edwards, Milwaukee; Louis T. Hill, Sparta; C. A. Conro, Rhineland; O. A. Stolen, Mount Horeb; C. P. Haseltine, Ripon; P. C. Avery, Oscar F. Fishedick, W. H. Raymond, C. W. Norris, Milwaukee; R. D. Gorham, Monroe; J. W. Bryant, LaCrosse; W. K. Coffin, Eau Claire; J. E. Plum, Manitowoc; Dr. T. E. Loope, Iola; Dr. A. E. Rector, Appleton; A. F. Winter, Sheboygan. The association now has a membership of 1,600 and is in excellent financial condition.

The board of directors was authorized to arrange for the third annual Wisconsin reliability tour for numerous perpetual trophies. The tour will be held in July. No route has been selected, but a 6-day tour is again a likelihood. Officers will be chosen in about 2 weeks.

As Usual Detroit Show Is a Large One

DETROIT, Mich., Jan. 23—Detroit's eleventh annual show, under the auspices of the Detroit Automobile Dealers' Association, opened last night with every car in place and a good-sized crowd at the pay gate. There were no formalities, for Manager Walter Wilnot doesn't believe in them in connection with an affair of this kind.

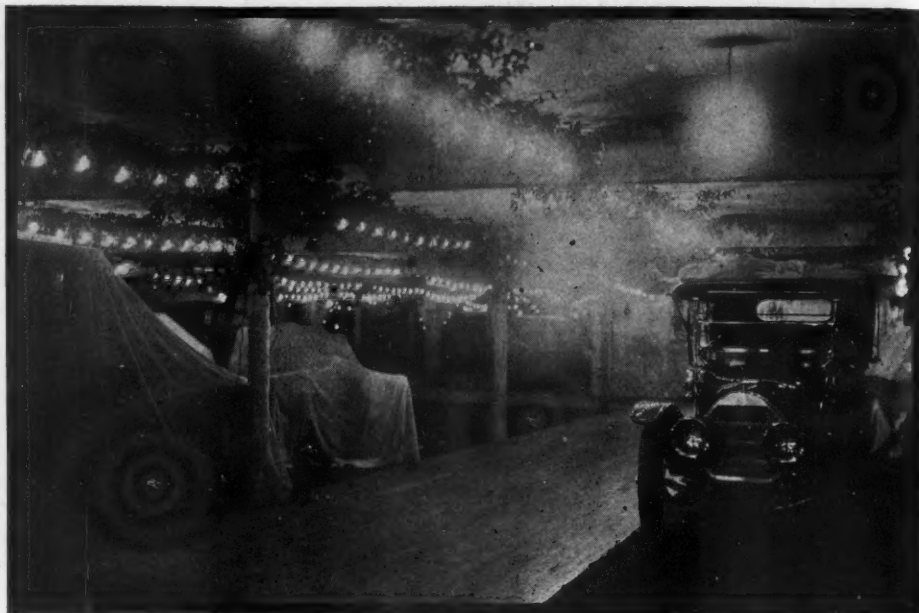
In its general scope, in the number and variety of cars shown, in the matter of novelties and in floor space for that matter, the Detroit show, in the judgment of many who have come on here from the east, compares favorably with the national exhibitions just closed in New York. It is claimed to be the largest and most important of the local shows scheduled for this year, with the possible exception of Boston, and the D. A. D. A. made this possible by building a temporary annex to the Wayne pavilion at a cost of more than \$10,000. This annex represents more than mere enterprise; it typifies the spirit of harmony and unity that now exists among the motor car interests of Detroit.

Show Comprehensive One

Practically all the advances made in the past year in the development of the motor car are mirrored in the exhibits that take up every available inch of the 50,000 square feet of floor space. With the single exception of the Auburn, every car manufactured or handled in Detroit is represented in this show, the list including seventy-five different makes of pleasure and commercial cars. There are eighty-three exhibitors, including about a score of accessory dealers or manufacturers, forty-three of whom have space in the main building and forty in the annex. The accessory exhibit is the first one of any importance ever seen in connection with a Detroit show and is a creditable one considering the fact that members of the accessory association are not permitted to participate in local exhibitions.

From a purely spectacular standpoint, the show excels any previous effort of the D. A. D. A. in this direction by long odds. The chief interest, of course, is centered in the second floor of the pavilion, with its high arched ceiling, its fountain, its countless thousands of white and green electric globes partly concealed in garlands of smilax and other greenery. At one end of the upper hall, overlooking the Detroit river, is the Wayne gardens cafe, an adjunct of the Wayne hotel, where refreshments may be obtained at the pleasure of the visitor, a most convenient arrangement and one that sometimes serves as a powerful ally in the selling of a car.

The walls and ceilings on both floors of the pavilion are covered with a material called abersheen, a patented product made of crinkled paper, waxed, fireproofed and delicately shaded. It is something en-



AS THE DETROIT SHOW LOOKED OPENING NIGHT

tirely new here and, combined with the other decorations, it produces an effect that one does not readily tire of. An immense canvas wheel, 20 feet in diameter, representing a motor car wheel, is suspended from the ceiling in the center of the upper hall. A duplicate of this hangs against the east wall at the far end of the auditorium, above the stage. Uniform sign boards mark off the respective spaces and these are of the same material as the walls and ceilings. A classic arch has been built over the stairway, which is lighted by a cut-glass chandelier.

The annex is decorated in purple and white bunting and American flags. A complete steam heating system has been installed and it is quite as comfortable as any part of the main building. The annex is 108 feet wide by 165 feet long and is strongly built, although it will be torn down within 5 days after the show closes. The floors throughout are covered with green denim, which harmonizes with the general decorative scheme.

Crowd Big Opening Night

It is impossible at this time, of course, to give any accurate estimate as to the possible attendance at the show, but the opening night's patronage fully met expectations and gives promise of a record-breaking week. The eastern dealers are already present in large numbers and hotel accommodations are taxed. The west and south sections are also well represented and the visitors without exception have expressed themselves as well pleased with what they have found. While the show in many respects is a duplicate of the Madison Square garden show, as far as the local makes are concerned, there are a number of cars that are being shown here for the first time anywhere.

Conspicuous among the novelties is the new Church-Field electric, just brought out by the Church-Field Motor Co., of Sibley, one of Detroit's down-river suburbs. It is claimed to be the first electric pleasure car ever built with a two-speed planetary transmission, which enables the car to climb a hill on low speed.

Underslung Frame on Electric

Other talking points are an underslung body and a consequently low center of gravity, a control with ten speed points instead of six and a control lever mounted on the steering column, and a specially designed motor, rigidly mounted in the center of the chassis and connected with the rear axle by a straight-line shaft drive. From 75 to 100 per cent more power is claimed for this motor than that of other cars of this type. The body is of classic design and the interior is richly upholstered, giving an appearance of elegance and refinement. The car is of standard tread and has a 100-inch wheelbase. The springs are long and flexible.

In addition to the coupe, the company plans to manufacture a roadster model but the total output of cars will be limited to a small number this year. Austin Church and H. George Field are the moving spirits in the new venture. Mr. Church is a graduate of the Stevens Institute of Technology and has a reputation as a designer of speedy motor boats. Mr. Field is a graduate of the University of Michigan and is an electrical engineer by profession. V. J. Gillett is the company's chief engineer and designer and Reginald M. Jones is sales manager.

Another new electric that makes its debut at this show is the Grinnell Electric Car Co.'s latest model, K, a roomy, luxurious coupe of the colonial type, with a

Philadelphia Starts on the Second Week



SCENE AT PHILADELPHIA DURING PLEASURE CAR SHOW

92-inch wheelbase, elliptical springs both front and rear, shaft-drive transmission direct through the springs, a hand-made body with moldings carved out of the solid wood, leather fenders fully enclosed and superb fittings.

Two brand new gasoline cars, each selling under \$900, are the Detroit and the Belmobile. The former was announced several weeks ago, but this is the first time it has been exhibited. It is the product of the Briggs-Detroit Co., recently incorporated with a capital stock of \$200,000, of which 80 per cent has been paid in. With its long-stroke motor, 104-inch wheelbase, its unit power plant and four-cylinder motor, cast en bloc, and its roomy body of the English torpedo type, it is a car to command attention and it is doing so. The Barber Motor Sales Co., with Zach C. Barber, formerly a distributor for the E-M-F line, as general manager, has been organized to take charge of the sales of the Detroit in Michigan. The Briggs-Detroit Co. has secured a factory on Holbrook avenue, and is prepared to turn out 1,000 cars this year.

New Cars Shown

The Belmobile is the product of the Bell Motor Car Co., of Detroit, the organization of which has just been completed, and the car shown is the first one put out. It is a two-passenger roadster with a 100-inch wheel-base, elliptical rear springs, 38 inches long and 1 3/4 inches wide, and semi-elliptical 35-inch springs in front; a sliding gear transmission, selective type; wheels, 30 by 3 inches; a 20-horsepower motor; thermo-syphon system of water distribution, a multiple-disk clutch and a Bosch magneto. The body is the low, racy, semi-torpedo type.

PHILADELPHIA, PA., Jan. 22.—With claims that would seem capable of verification judging by the interest manifested, that with adequate facilities the Philadelphia show would rank third only to the expositions held annually in Chicago and New York, the local exposition closed its doors upon part I Saturday night, and tonight the gasoline pleasure cars will give way to their more utilitarian but more practical cousins, the commercial vehicle; and to electrically-propelled pleasure cars.

Just as last year made the flood tide of success in local exhibitions, so will the 1912 show go down in local history as excelling all previous events. Certainly in point of attractions this eleventh annual exposition has shown its heels to any of its predecessors. It is the consensus among dealers that an exceptionally large proportion of visitors last week was composed of buyers or else those that are considered good prospects, and that the amount of business transacted was greater than had ever before been transacted during a pleasure car show week.

With the haste and hustle incident to opening day over, a repetition of the activity occurred on Sunday and Monday, and it was well toward evening last Monday before the exhibition could be said to be under full sway, the interior of both the First and Third Regiment armories undergoing a complete transformation between Saturday and Monday.

Exhibits that formed a feature of the Madison Square garden show were shipped here upon the conclusion of the gasoline pleasure part of that exhibition and usurped the places of exhibits temporarily installed for the opening Satur-

day night. This work completed, both buildings were chock full from heel to toe with motor cars.

For business activity the show reached its climax Friday afternoon and evening. Never before have so many cars been sold. This applies to both the expensive machines and to the light, moderate-priced car, the latter type by reason of their adaptability for short trips and general every day usage having made great strides in popularity. Upon completion of the first half of the show many of the exhibits will be delivered immediately to their new owners.

In addition to the "fifty-seven varieties a score of accessories dealers held forth with all the latest appliances in the way of motoring helps. This side feature while not as large a one as might be desired was nevertheless a complete exposition of all that was newest.


Supplementing the big show are numerous individual exhibitions that have entertained throngs attracted to motor row during the past week. What appealed particularly to the devotees of a particular make is the fact that at the show-rooms a more complete line is in view owing to cramped quarters at the armories, where only a portion of the company's product could be housed. These independent shows are in full swing throughout the 2 weeks of the show.

Outside Shows Numerous

One of the largest of these is that of the Buick Motor Car Co., 235-237 North Broad street, where the entire exhibit of the Madison Square garden is installed, 6,000 square feet of floor space being given over to the display of twenty-four different models of Buick cars. The Lion Sales Co., formerly the Motorette Co. of Philadelphia, is holding an exhibition of Lion cars and pleasure and commercial motorettes at the local show rooms, 234 North Broad street. The recently organized Ottomobile Co. is holding a 2 weeks' independent exhibition at 2037 Market street. W. Wayne Davis has been conducting practically three exhibitions, showing the Everitt car in the First Regiment armory, at the show rooms, Broad and Green streets, and in the dining room of the Continental hotel. Practically every dealer whether represented in either of the armories or not is holding his own show. This week's exhibition of pleasure electrics and motor trucks comprise the following:

First Regiment armory—Electric pleasure cars: Baker, Columbus, Detroit, Flanders, Hupp-Yeats, Rauch & Lang, Waverley and Woods; commercial vehicles: Autocar, Brush, Cartecar, Commer, G. M. C., Gramm, Kelly, Mercury, Morgan, Peerless, Sandusky, Seitz and Speedwell.

Third Regiment armory—Commercial vehicles: Chase, Walker, Waverley, Maiz, Commercial, Sampson, Pierce-Arrow, Alco, Knox, Packard, Reo, Philadelphia, Ford, Lozier, Baker, Cameron, Mack, Saurer, Locomobile, White and Kisselkar.



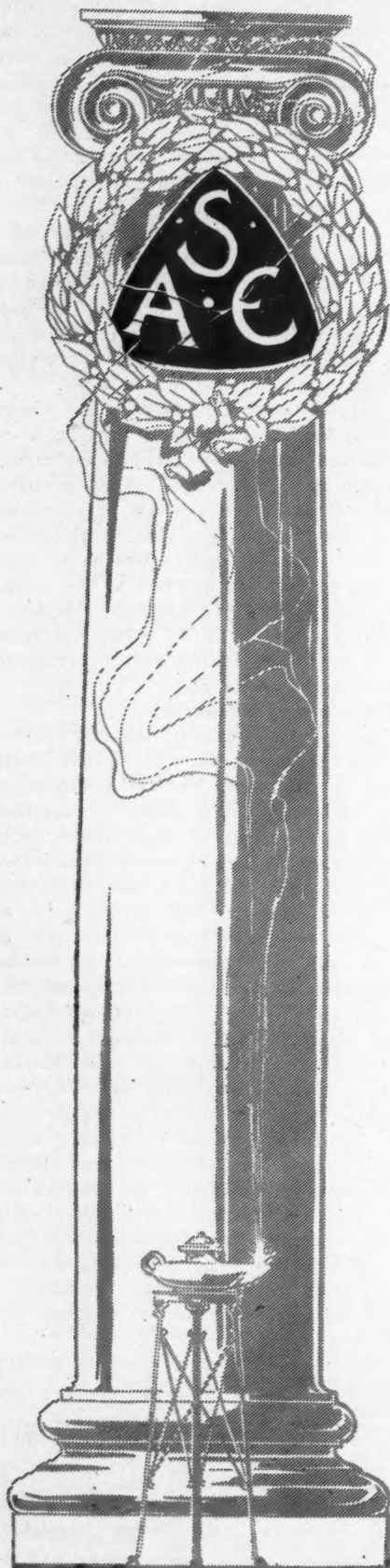
NEW YORK OFFICE
239 West 39th Street

MOTOR AGE

Published Weekly by
THE CLASS JOURNAL COMPANY
 910 SOUTH MICHIGAN AVENUE CHICAGO

SUBSCRIPTION RATES
 United States and Mexico
 \$3.00 per Year
 Other Countries including
 Canada \$5.00

Entered as Second-Class Matter September 19, 1892, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879



The Work that Is Needed

"The thing that is uttered from the inmost heart of a man's soul differs altogether from what is uttered from the outer part. The outer is of the day, under the empire of mode; the outer passes away in swift endless changes; the inmost is the same, yesterday, today, and forever."—Thomas Carlyle in Heroes and Hero Worship.

IT is this inmost spirit in many of its members that has made the Society of Automobile Engineers grow from a handful of enthusiasts 5 years ago to the role of an industry fashioning body of today.

IT has been this spirit in the members who have met in committee, who have read papers and who have taken part in discussion; this opening of the secrets of their hearts to the society at large that has made such development possible. It has been this giving of what is generally known as trade secrets to the transactions of the society that has made the weaker members strong, that has made the strong members stronger, and that has made the society a developing atlas in the world of engineering science today.

IT takes stamina for an engineer to get up in an S. A. E. session and talk in favor of designs, and processes of construction, which his own board of directors will not allow him to put into practice but which he believes heart and soul are correct. During the last 3 years many examples of this have taken place in discussions on problems which are now the big factors of motor car development. A score or more of cases are on record where a fearless, competent engineer has voiced sentiments that he has afterwards been taken to task for by his general manager and president. These actions, questionable as they have been from the factory viewpoint, have been the corner stones of the present structure of scientific progress that the S. A. E. is rearing.

ALTHOUGH but 2 years ago only one or two of these stalwarts, who were not afraid to express their inmost thoughts, were to be found, today their number is growing. The seed they scattered not more than 24 months ago is bearing fruit, and today the engineer who stands up and expresses his inmost thoughts, whether they coincide with the views held by his factory or not, is applauded by the other members of the society. Where there was one case not 2 years ago there are a dozen today. This is the most healthy indication of the growth of the S. A. E. It is this that marks the society as a permanent organization.

THERE have been many engineers who have held aloof from the various sessions of the S. A. E. They have looked upon the society as more or less of a class of medium engineers. They have felt that they were above them. They felt that they had trade secrets which had cost them money and they are not going to give these trade secrets away for nothing. They played the role of the Pharisee, wrapping their robes around them, folding their arms, and thanked God that they were not as other engineers were. These haughty ones are falling from their high places. Some of them have already started downwards. They have found that while they imagined they were the alpha and omega of engineering, that today they have scarcely a place in the alphabet. Some of them are hurrying into the fold; others still hold aloof, but are taking advantage of the work that the S. A. E. has done without even saying thank you.

WHAT has the S. A. E. done for these Pharisaical engineers? It is saving these engineers weeks of work each year, and saving their companies tens of thousands of dollars. The fact that the standards committees have in standardizing tubing, wheel sizes, magnetos, and a few other parts, has alone meant thousands to these concerns, although some of them are not big enough to realize it. A membership in the S. A. E. has been one of the best investments that any motor car manufacturer in America, or any accessory manufacturer either, could make.

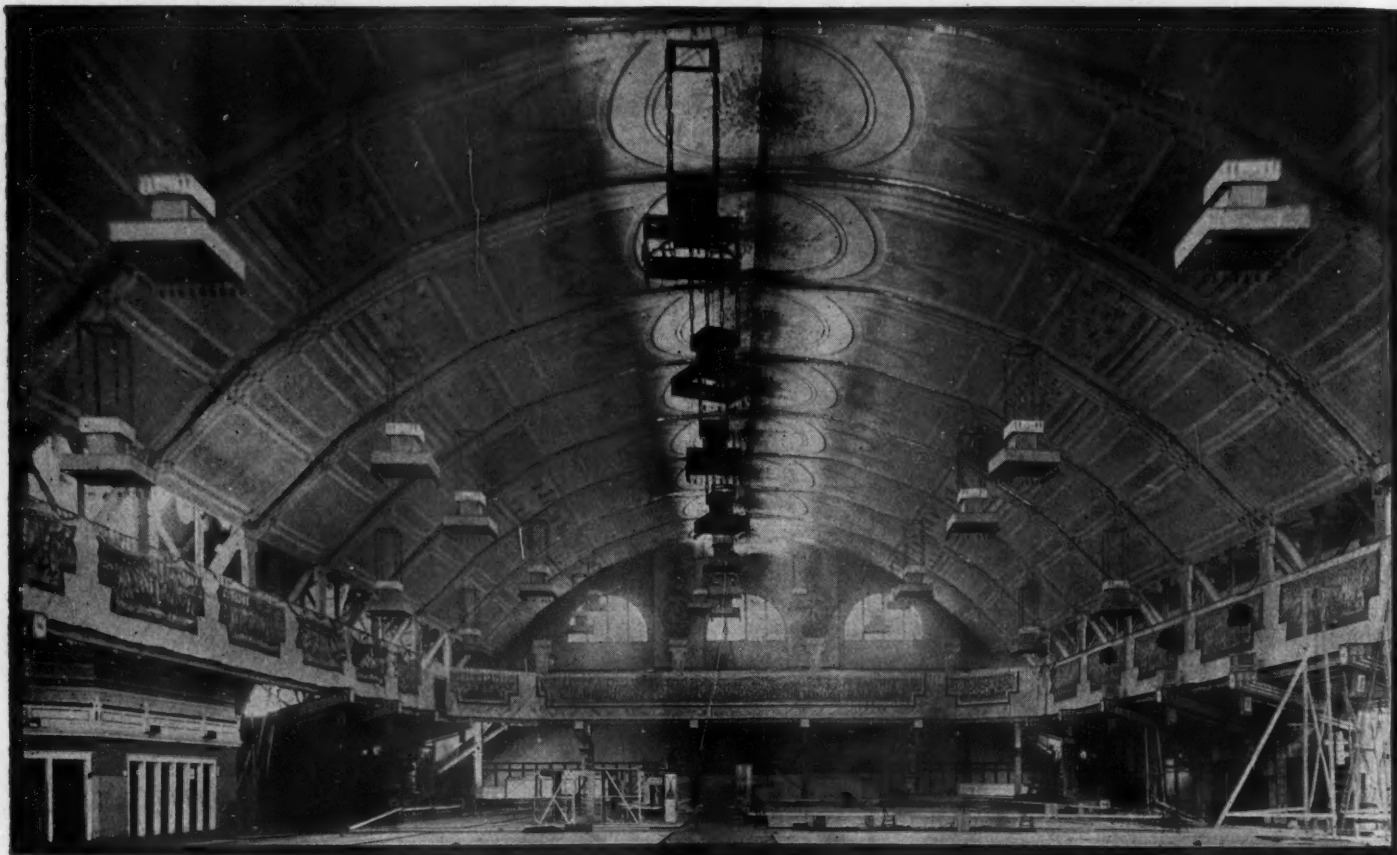
SOME accessory makers, who thought they had nothing in common with the S. A. E. and its standardizing work have today realized that it is making their work easier; that specifications are coming in along standard lines, and that their lines of sizes are so reduced that manufacture is much cheaper and it is possible to carry supplies in stock for immediate delivery. Such conditions were never possible under the old regime, when there were 1,100 different sizes of seamless tubing as compared with 150 sizes today and when there were 750 different shapes and sizes of lock washers as compared with 32 at present.

In These Days of Real Competition



There's Still Good Fishing

Chicago To Have a Big Business Show



AS THE COLISEUM LOOKED MONDAY AFTERNOON WHILE DECORATING WAS BEING DONE

CHICAGO, Jan. 24—In keeping with the general trend of national shows, the eleventh annual exhibition of the N. A. A. M. which opens in the Coliseum and the First Regiment armory next Saturday afternoon promises to be, first of all, a business show and next a display of motor products that is intended to interest the outsiders and possibly induce them to invest in this mode of transportation. Chicago always has been noted for the amount of business that has been done at its annual motor displays and this year promises to be no exception to the rule; in fact it looks as if the eleventh show would outstrip any of its predecessors.

Stronger efforts than ever have been made to get the dealers to attend the show. The management has secured from each car manufacturer who has space at the show a list of his agents and has sent to each dealer in the territory bounded on the east by Buffalo on the south by Louisville and the west by Denver an invitation to attend the affair, each invitation containing a coupon which is good for a season pass to the show.

Big Territory Covered

In all more than 5,000 of these invitations have been scattered broadcast through this territory. In addition to this dealers who do not receive the invitations are invited to come on anyway and are

Eleventh Annual Exhibition of the N. A. A. M. Promises To Be Exceptionally Beneficial Both to Dealer and Car Maker

assured of free tickets upon proving their identity at the box office. Chicago had 2,000 out-of-town agents last year, and it is estimated that the approaching show will attract at least 2,500.

Both Buildings Packed

This is to be a larger show than last year, although by not much margin for the reason that the management has no more space at its disposal than it has had in the past. Long ago all this space had been allotted and since that time there have been applications enough to have filled another armory if it were possible to secure such a building and locate it in the vicinity of the Coliseum. Still, notwithstanding all this, the management has been able to provide accommodations for ninety-six different makes of pleasure cars, whereas a year ago there were ninety-four. In the accessory department there also has been a slight increase, the show the first week having attracted 201 makers of accesso-

ries as against 191 in 1911. The commercial exhibit which takes place the second week has shown a most astounding growth, eighty-two makers of power wagons having been booked for space as against fifty-one last year.

Naturally a year has seen a shifting about in the industry and there have been several names appear on the list which were not on the 1911 roster. Among the makes that were not in the 1911 show but are showing for 1912 are the Abbott-Detroit, Firestone-Columbus, Marquette, Regal, DeTamble, Cino, Imperial, Warren-Detroit, Paterson, Stutz, Bergdoll, Lion, Republic, King, Davis, and Michigan and such electric cars as the Borland and Standard.

There are a score of pleasure cars which were in the 1911 show but are not in this year's affair, the list including the Studebaker, Atlas, Falcar, Babcock, Dorris, Royal Tourist, Lambert, Speedwell, Diamond T, Benz, Courier, Midland, Chadwick, Schacht, Kenmore, Enger, Middleby, Ames, B-CK and Zimmerman.

Commercial Car Exhibits

There has been about the same kind of a shift in the commercial department and the new makes of trucks which appear for the first time in the 1912 show are the Whitesides, M & T, Schacht, Besse-

mer, Commerce, Service, Diamond T. Law, Blair, Poss, Baker, Locomobile, Brush, Gramm, General Motors, Staver, Lozier, McIntyre, Autocar, Premier, Atterbury, Best, Dorris, Buick, Commer, Walker, Stegeman, Sanbert, Dain, Lauth - Juergens, Packers, A. O. Smith, Old Reliable, Motor Wagon, C-P-T, Nateo, Mogul, Modern, Indian, Mercury, Wilcox, Speedwell and Velie. Missing are

the Mais, Hart-Kraft, Studebaker, Courier, Overland, Atlas, Chicago Commercial, Economy, Marquette and Brodesser.

Is a Makers' Show

That this is a makers' show and not a dealers' proposition and that it has the full support of the industry is shown by the list of exhibitors which include nearly all of the prominent pleasure car concerns of the country. On the main floor of the Coliseum in the show which opens Saturday will be Winton, Rambler, Franklin, Buick, Marmon, E-M-F, Flanders, Woods electric, Locomobile, Lozier, Hudson, Reo, Oldsmobile, Packard, Pierce-Arrow, Stevens-Duryea, Chalmers, National, Columbia, Maxwell, Stoddard-Dayton, Premier, Cadillac, Overland, Peerless, Brush, Thomas, Pullman, Knox, Columbia, White, Haynes, Corbin, Everitt, Hupmobile, Oakland, Stearns, Mathe-

son, Mitchell, and the Abbott-Detroit. In the Coliseum annex there are eight concerns located, showing the Alco, Cole, Elmore, Baker electric, Ohio electric, American, Selden, and Glide.

In the armory will be found the R-C-H, Hupp-Yeats electric, Waverley electric, Columbus electric, Inter-State, Marquette, Moline, Rauch & Lang electric, Case, Garford, Detroit electric, Amplex, Cartecar, Jackson, Regal, Austin, DeTamble, Kisselkar, Staver, Krit, Cunningham, Great Western, Fiat, Cutting, Imperial, Warren-Detroit, McFarlan, Auburn, Paterson, McIntyre, Moon, and Flanders electric.

Cars in the Basement

There are eighteen concerns located in the basement of the Coliseum including the Stutz, Westcott, Crow, Borland, Broe, Halladay, Bergdoll, Otto, Michigan, Lion, Colby, Lexington, Ohio, Standard

electric, Republic, King, Davis, and Cino.

The accessory exhibit is to be most complete, particular strength being shown by the tire concerns which have taken liberal space, such makes as the Michelin, Diamond, Morgan & Wright, Goodrich, Goodyear, Firestone, Federal, Motz, Pennsylvania, Swinehart, Ajax, Republic, Consolidated, Hartford, Continental,

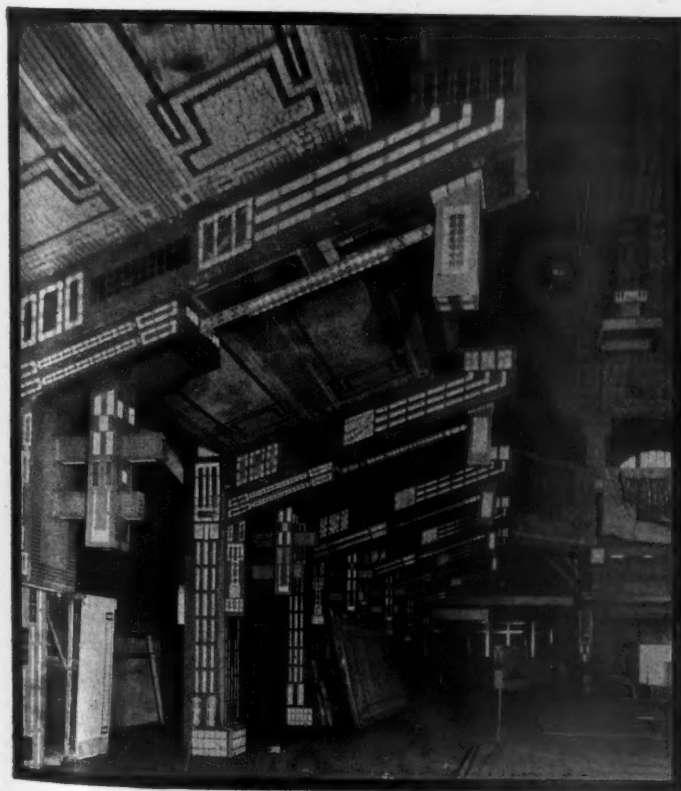
G & J, Empire, Batavia, Voorheis, Stein, and Shawmut being listed. There are such prominent carbureter concerns as Wheeler & Schebler, Kingston, Rayfield, and Stromberg booked to make factory exhibits. Stewart, Warner, Jones and Veeder are among the speedometer people who are showing while nearly all the other big concerns in the accessory field are booked for space.

Decorations this Year

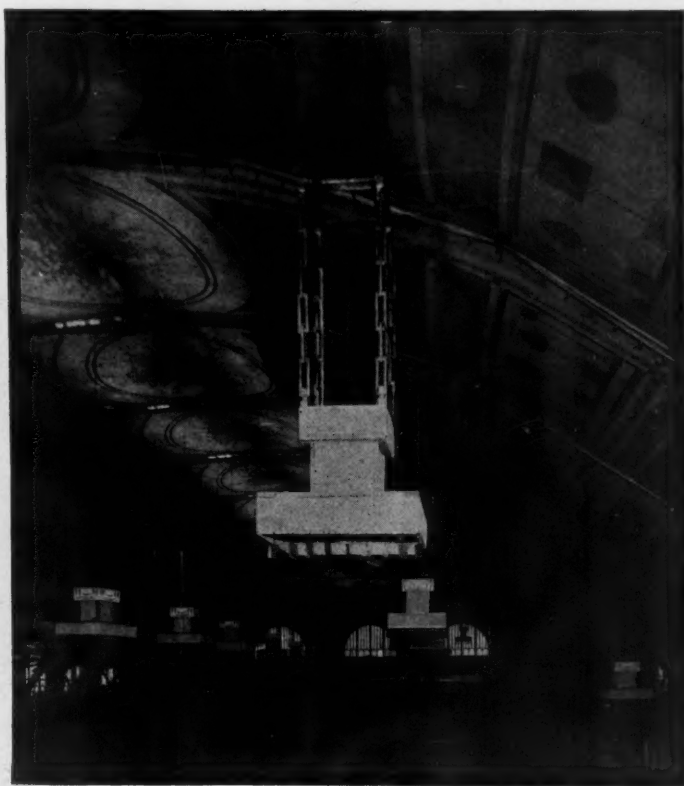
The N. A. A. M. secured possession of two buildings on Monday when a small army of workmen started installing decorations and preparing for the opening of the show on Saturday afternoon. The decorations were completed a couple of months ago and have been in storage ever since, so it was an easy matter to install them. When the doors are opened the spectators will be greatly surprised



DECORATIONS BEING HAULED TO SHOW BUILDINGS



MOSAIC EFFECT OF DECORATIONS



LIGHTING SCHEME IN COLISEUM



HUGE PAINTING AT THE NORTH END OF THE COLISEUM

because there has been a radical departure in the way of decorations and the setting will be entirely different in character to anything previously furnished. The Coliseum will be purely architectural in effect throughout. The ceiling, as heretofore, will be covered to enhance the effect of the general decorative scheme. The girders will be hidden by a mosaic design relieved at intervals by mural paintings, the whole effect being light in color, with amber and gold predominating.

The space in front of the gallery will be paneled in the same effects, relieved by massive pillars and surmounted by a picket fence running around the gallery front, the fence being decorated to correspond with the ceiling.

The two end walls above the gallery will be covered by immense drop curtains extending from the roof to the floor. The band stand will form a part of the design of one of them. The walls on the main floor will be paneled in light blue and mahogany, as will the girders which support the gallery. The ceiling will be paneled in a style to match the roof.

The building will be illuminated by thirty-six chandeliers, each about 4 feet deep and 5 feet square at the base, and each containing eight 500-watt tungsten lamps. This, it is expected, will furnish more perfect lighting than ever before, and in turn will be helped out by the fact that the entire decorative scheme is light in color.

Mosaic Design Predominates

On the dividing lines of the spaces on the main floor running north and south there will be a mass of balustrades and pillars, all of mosaic design, and some of them furnished in the genuine article, imported pearl being used for the purpose. Surmounting the pillars will be art glass lamps of great size, corresponding in general design with those pendant from the roof. The gallery, annex and basement will be similarly treated. There will be absolutely nothing about any part of this building suggestive or reminiscent of the past of either the motor car or other show.

On the main floor of the armory there

will be some material similar in design to that of last year. Staff walls, pillars and vases of the Louis XIV. design will be combined with flowers, foliage and ornamental lamps. The ceiling, for the first time, in the armory will be flat instead of semi-circular. The trellised design will bear flowers and vines. A drop curtain similar in character running from the third to the second balcony will surround the building. All of the walls will be paneled in light blue and mahogany.

Heretofore the floor covering has been of green denim or something of the same character. This year a material nearly $\frac{1}{2}$ inch thick with a hard surface, painted gray, has been adopted. Each evening when the show is closed this will be repainted, so that in the morning the show will appear bright and clean as on the first day.

The lighting effects in the armory will be similar to those in the Coliseum, except that the coloring of the chandeliers will be in keeping with the changed design.

TOLEDO AVERAGES 9,000 A DAY

Toledo, O., Jan. 20—The Toledo show held this week under the management of the Toledo Automobile Dealers' Association proved by far the most successful show ever held in this section of the country. Despite the severe weather there was an average daily attendance of more than 9,000. A pleasing feature was the unexpectedly large attendance from the farms and smaller cities of northwestern Ohio. Thousands of out-of-town visitors covering a radius of about 150 miles were present.

A large number of cars, especially pleasure cars, were sold outright and many others will be sold a little later on. One firm reported the sale of more than twenty-five cars during the week. All exhibitors were wholly satisfied with the business done. It is difficult to estimate the volume of business done, but in almost every case it exceeded expectations. The one possible exception was



in the line of trucks. While there were numerous interested inquirers in this department, perhaps not to exceed half a dozen sales were fully consummated for trucks. Truck exhibitors, however, express themselves as well satisfied and say that they will still reap a fair harvest as the result of their efforts, as they have accumulated a large number of good prospects which will develop into sales.

The bulk of the demand appeared to be for the medium-priced cars ranging in price around \$1,000, although a good many higher class cars were moved. The accessory booths were kept busy during the entire week. Self-starters and automatic tire pumps proved very attractive and crowds were to be found at these booths all the time.

The show was held in the big Terminal Belt depot and yards on Cherry street, the sheds being walled in.

One of the results of the show is that it has placed perhaps more than a score of new men in the business in northwestern Ohio. Toledo dealers who had open districts in this territory found no trouble in closing it up for sub-dealers during the week. Many applications were turned down, as there was not room to accommodate all who wished territory for engaging in the motor trade.

ROCHESTER HOLDING A SHOW

Rochester, N. Y., Jan. 24—Two hundred cars of various models representing an aggregate cost to the various local dealers of \$200,000 are on display at the fourth annual show, which is being held this week in the New York state armory, this city, under the auspices of the Rochester Automobile Dealers' Association. The armory drill floor affords the largest exhibition floor space of any hall in Rochester and it was for that reason that the state armory was selected for the annual show. There were many local dealers who were unable to secure space at the armory for exhibition purposes and they will display their cars at the Buffalo show to be held February 5-10.

Pleasure vehicles are being displayed on the ground floor space, while in the base-

ment of the armory trucks and accessories are on exhibition. A delegation of Buffalo dealers will visit the Rochester show to secure ideas to be carried out in effects and decorations for their exhibition to be held early in February.

SHOW IN ARIZONA

Phoenix, Ariz., Jan. 21—After 8 days of brilliant, unalloyed success the first show ever held in Arizona closed here last night. The exhibition was held in the new brick-concrete garage of the Arizona Motor Co. Every inch of the 1,200 feet of floor space was taken and more space could have been sold. Practically all the Phoenix garages had space at the show. Cadillac, Cutting, E-M-F, Flanders, Liberty-Brush, Franklin, Hupmobile, Hudson, Mitchell, Regal, American, Apperson, Velie and Buick cars were exhibited. A number of Phoenix merchants took advantage of the opportunity to display their manufactures and wares. Thursday evening was given over to fun. A track around the floor was cleared and a number of exciting pushmobile races were held.

RECORD CROWD AT MILWAUKEE

Milwaukee, Wis., Jan. 22—Nearly 40,000 persons attended the fourth annual Milwaukee show, which was held from January 13 to 19, inclusive. The average daily attendance was in excess of 4,750 and reached as high as 6,770. It was the largest show financially that Milwaukee has known since the show idea was introduced in 1909 by the Milwaukee Automobile Club. In spite of the immense success of the Milwaukee show this year there is a strong sentiment toward a later date and especially a date which will follow the Chicago exposition.

Not until Monday or Tuesday did some of the dealers have their show cars on the floor. Railroads were unable to make deliveries on schedule because of the cold weather. If the Milwaukee show had followed Chicago it would have been an easy matter to get the Chicago cars to Milwaukee without delay, either on trains, by express or freight, or under their own power.

The Milwaukee show is, for all intents and purposes, an inducement of retail buying, or more than that, to create further interest in motor cars and especially among non-owners. Exhibitors this year say they sold approximately 400 cars in the aggregate, but it is safe to say that not more than 20 per cent of these was sold to individual buyers.

This year's Milwaukee show attracted more dealers to the city than any previous show. It was held early enough to garner in a lot of small dealers who had not yet contracted for 1912

with the Milwaukee state representatives. The annual meeting of the Wisconsin State Automobile Association brought many owners who probably would not have come otherwise. Likewise, it brought a lot of owners to Milwaukee who would not have come simply to see the show.

The organization meeting of the Wisconsin Retail Automobile Dealers' Association and the Wisconsin Commercial Car Makers' Association served a similar purpose.

There were several instances at Milwaukee where 1911 cars were shown as 1912 models, when in reality they were late '11s, simply to be represented and yet not divulge new things which will be sprung at Chicago next week. In spite of all this the Milwaukee show was a most creditable one. It was all and more than the most enthusiastic of its promoters desired or expected. Almost every car exhibitor had a polished chassis, while a year ago there were fewer than a dozen.

The Milwaukee Automobile Dealers' Association will realize a profit of about \$5,000 from the show, although it is not the intention to make money. This profit will, as usual, be distributed judiciously, most of it going toward highway improvement by contribution to various associations which are improving and maintaining definite stretches of highway leading out of Milwaukee. The Milwaukee-Chicago and Milwaukee-Oconomowoc road associations will be the largest beneficiaries.

NO WASHINGTON SHOW

Washington, D. C., Jan. 20—Owing to the inability of the show committee to secure Convention hall at any time during February, the present prospects are Washington will not have a show this year. When the show committee was organized several weeks ago a tentative date—February 1-7—was selected, but since then it has been ascertained that Convention hall, the only suitable place in Washington in which to hold a show, is under rental for practically the entire month of February. There is much opposition to holding a show as late in the season as March. A meeting of the dealers will be held during the coming week for the purpose of deciding the question whether a March show is desirable or advisable.

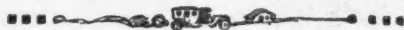
LOS ANGELES' PLANS

Los Angeles, Cal., Jan. 22—The Los Angeles dealers have decided not to hold a joint show this year, but instead will try the experiment of a salesroom show. This show will be held during the second week in February, and the Los Angeles Dealers' Association now has a committee working on the plan. Several unique features will be introduced.



FROM FLOOR TO ROOF IN CHICAGO COLISEUM

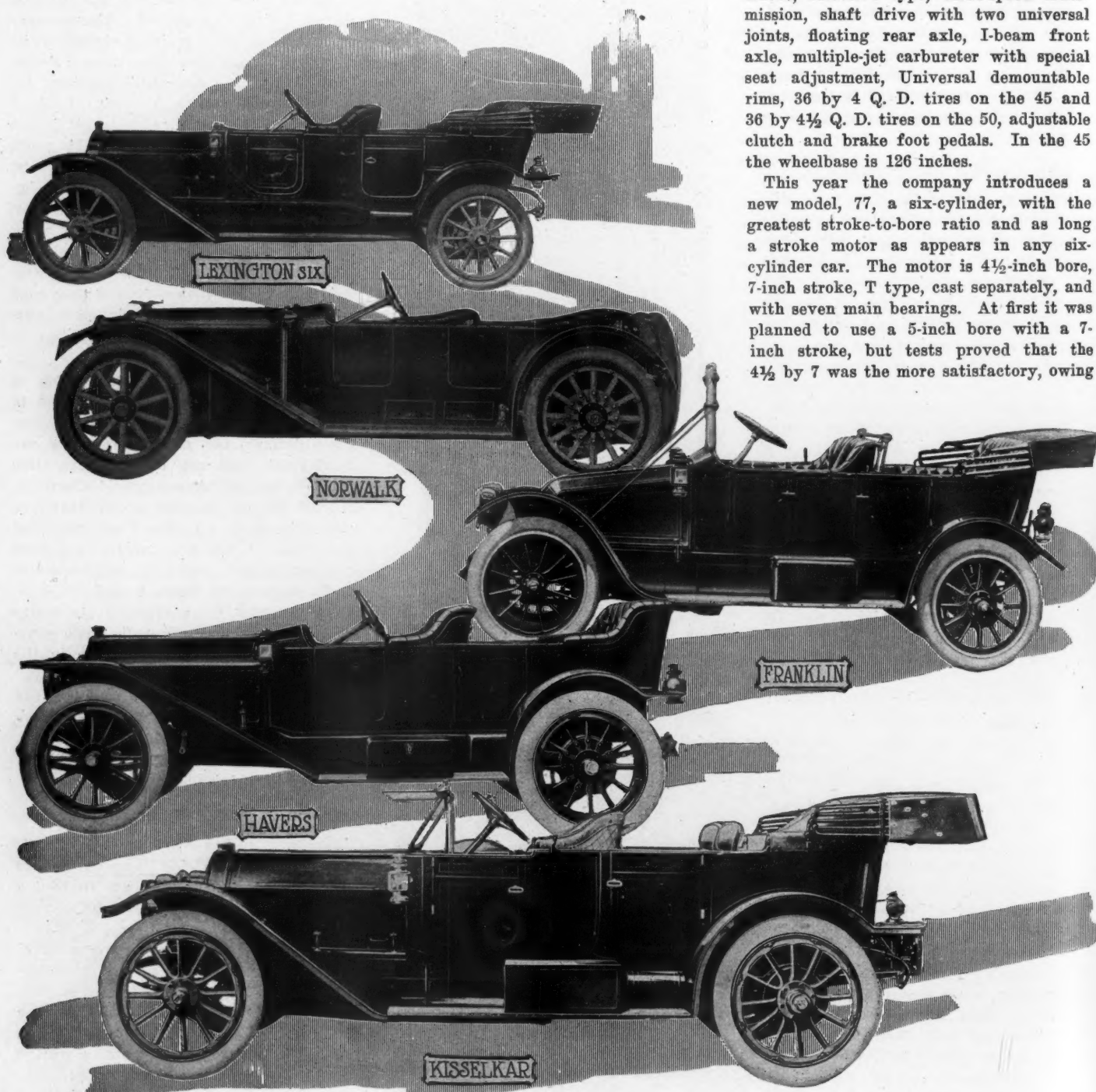
Changes in Gasoline Cars Not on View



In preceding issues Motor Age has reviewed the changes which have been made for 1912 in the pleasure cars exhibited at the New York shows. In the issue of January 4 the pleasure cars in the Madison Square garden were illustrated and the changes noted, while in the issue of January 11 the Grand Central palace cars received similar treatment. Herewith is presented the story of the changes in pleasure cars that were neither at the garden nor the palace. Most of them are to be found in the Chicago show, but there are some which are not on the national circuit at all, and others which have not been described

THERE are some changes of importance in the Austin cars for 1912, and minor improvements have been added as they suggested themselves to the manufacturers. The engines and all parts of importance remain the same as last year, at least in models 45 and 50, which are furnished either for two, four, five or seven passengers. The four-passenger body, however, has a place under the body for an extra tire, a compartment with doors being furnished. The 45 is a six-cylinder, $4\frac{1}{8}$ by $5\frac{1}{4}$, and the 50 is a six-cylinder, $4\frac{1}{2}$ by 6. Both have two separate and complete systems of ignition, multiple-disk clutch, selective type, three-speed transmission, shaft drive with two universal joints, floating rear axle, I-beam front axle, multiple-jet carburetor with special seat adjustment, Universal demountable rims, 36 by 4 Q. D. tires on the 45 and 36 by $4\frac{1}{2}$ Q. D. tires on the 50, adjustable clutch and brake foot pedals. In the 45 the wheelbase is 126 inches.

This year the company introduces a new model, 77, a six-cylinder, with the greatest stroke-to-bore ratio and as long a stroke motor as appears in any six-cylinder car. The motor is $4\frac{1}{2}$ -inch bore, 7-inch stroke, T type, cast separately, and with seven main bearings. At first it was planned to use a 5-inch bore with a 7-inch stroke, but tests proved that the $4\frac{1}{2}$ by 7 was the more satisfactory, owing



in Either of the Big New York Shows

partly to the fact that the latter type permits the use of higher compression. The car has a self-starter, worked by a high-pressure air system.

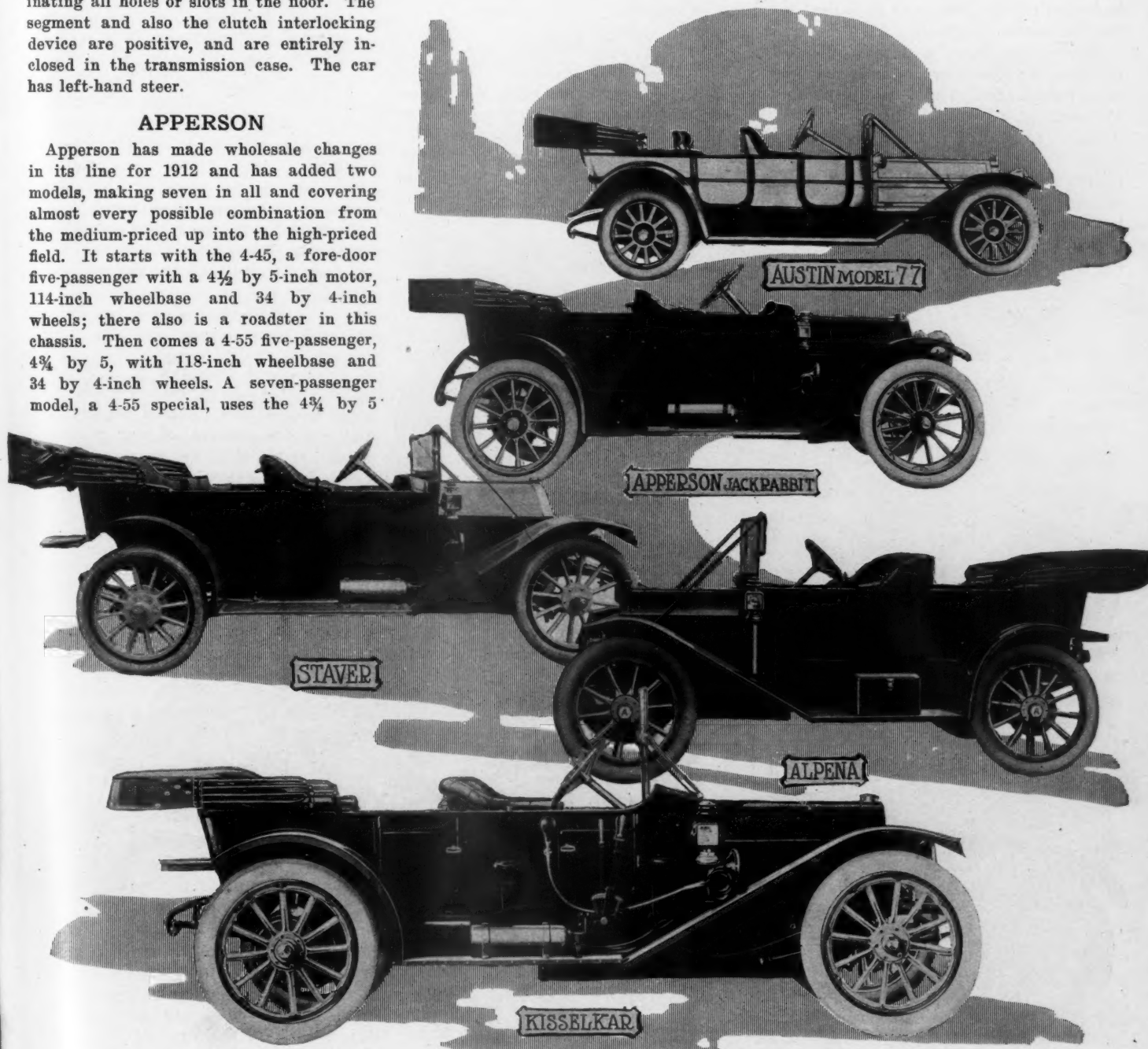
A new double combination ignition system is used, with two sets of spark plugs, either set being capable of being fired separately or both being capable of being fired simultaneously. The oiling system is force feed, with separate adjustment for each cylinder. The oiling adjustment is on the outside of the case and can be instantly set to any desired point.

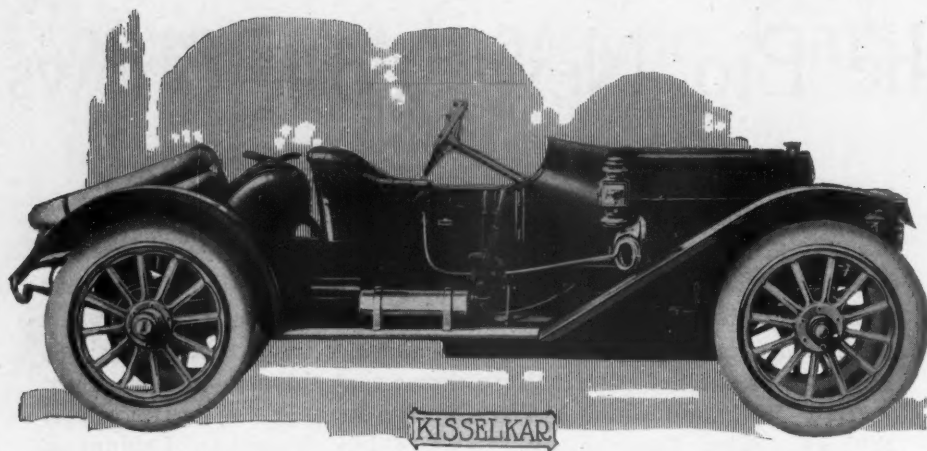
The clutch is the new multiple-disk, with seventy-seven saw steel plates hardened, tapered and ground. The center control lever is very short and has a ball-and-socket joint at the floor connection, eliminating all holes or slots in the floor. The segment and also the clutch interlocking device are positive, and are entirely inclosed in the transmission case. The car has left-hand steer.

APPERSON

Apperson has made wholesale changes in its line for 1912 and has added two models, making seven in all and covering almost every possible combination from the medium-priced up into the high-priced field. It starts with the 4-45, a fore-door five-passenger with a $4\frac{1}{2}$ by 5-inch motor, 114-inch wheelbase and 34 by 4-inch wheels; there also is a roadster in this chassis. Then comes a 4-55 five-passenger, $4\frac{3}{4}$ by 5, with 118-inch wheelbase and 34 by 4-inch wheels. A seven-passenger model, a 4-55 special, uses the $4\frac{3}{4}$ by 5

The Chicago show usually has makes of cars displayed that are not in either of the New York shows and at the same time it has nearly all of the cars that New York does. This year is no exception to the rule, although there are not so many as on previous occasions. A glance at the list of exhibitors shows that the cars that were not at New York and which are at Chicago include the Austin, Crow Elkhart, Colby, Cunningham, Davis, Glide, Kisselkar, Lexington, Pratt-Elkhart, Republic, and Staver. The Ford company is not in any show. The Franklin six shown is a new model just out





motor but has a wheelbase of 122 inches and 36 by 4½-inch tires. A 4-55 coupe is found with the 4½ by 5 motor and with 114-inch wheelbase. The 4-65, with 5½ by 5-inch motor, has a seven-passenger body and the same chassis also is used for the Jackrabbit roadster.

There have been a few mechanical changes, the oiler now being in the base of the crankcase. The fan is adjustable and dual instead of double ignition is used. A cellular type of radiator is fitted in place of the tubular one. Demountable rims are fitted to all models. More horsepower is given. A self-starter is not fitted but one can be had as an extra. The Apperson this year, outside of this one exception, sells its cars completely equipped

with top, windshield, speedometer, etc. In body styles the fore-door idea has been generally adopted and in closed bodies the Apperson has coupes and limousines. The new year has seen a revamping of the line which is most apparent.

ALPENA

The Alpena has seven models on two chassis, the smaller one using a 30-horsepower Rutenber motor and the other one a Rutenber 40. On the latter the bore and stroke are 4½ by 5¼ and on the former 4 by 4. On both motors the cylinders are cast separately. On the big chassis a multiple-disk clutch is used; Warner gearset, centrifugal pump in the water system, dual system of ignition, splash

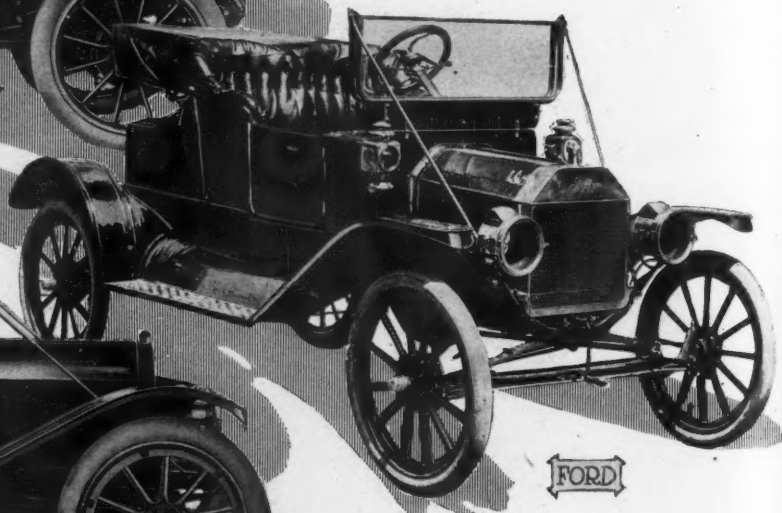
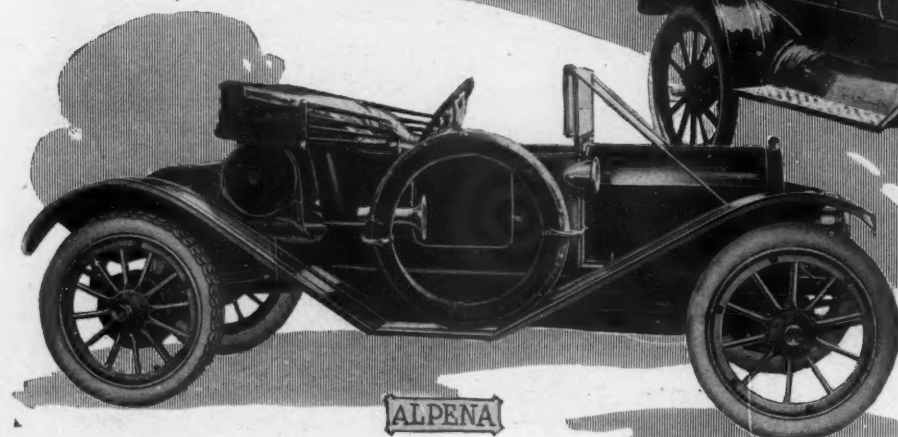
lubrication, I-beam front axle, floating rear, 36 by 4-inch tires, and 120 wheelbase. The smaller chassis is much the same in general, but the clutch is of the cone type, the wheelbase 112 inches, a semi-floating rear axle instead of one of the floating type, 34 instead of 36-inch wheels. On both demountable rims are used and a self-starter is part of the equipment.

CROW ELKHART

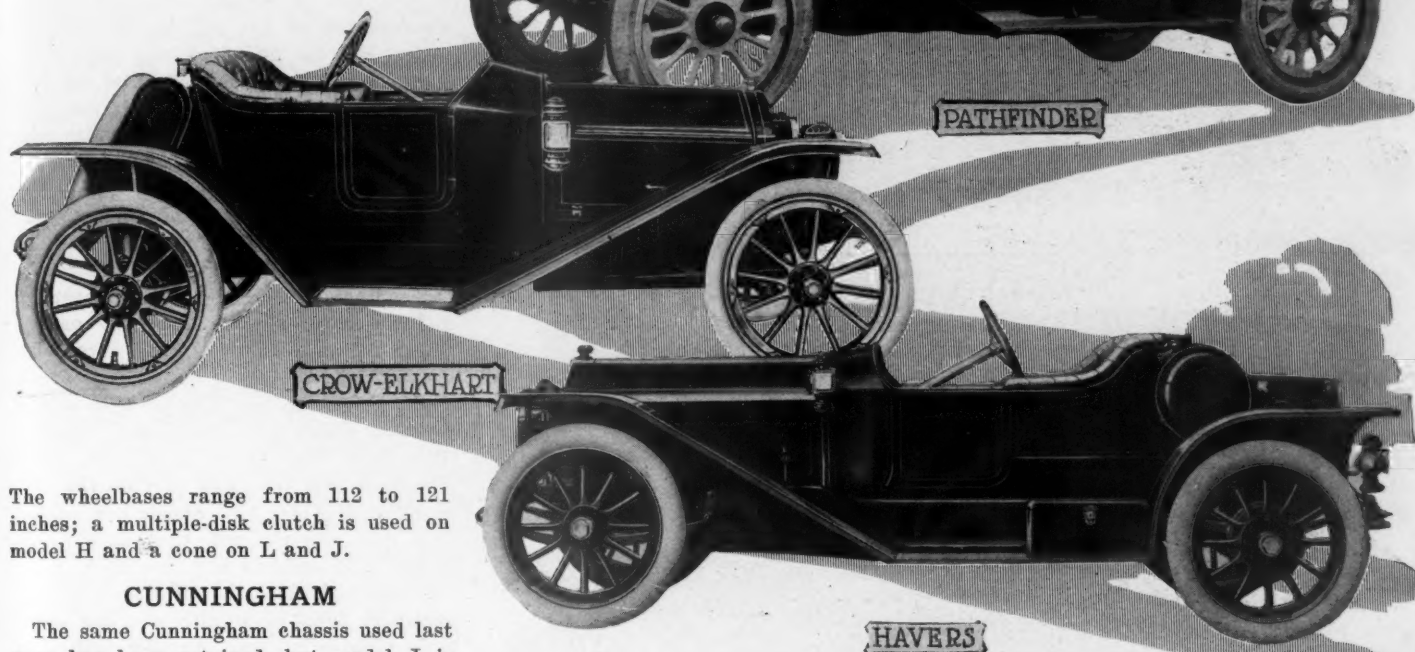
Twelve distinct models on five different chassis, including roadsters, touring cars, coupes and delivery wagons, make up the 1912 line of the Crow Elkhart, the motors being of 25, 33, 38, 40 and 45 horsepower. The motor used in models 51, 52, 53, 54, 60 and 61 has 4-inch bore and 4½-inch stroke, the cylinders being cast en bloc, with the intake and exhaust manifolds integral. On models 55, 56, 57, 58 and 59 the cylinders are cast in pairs and have 4½-inch bore and 4¾-inch stroke for model 55, 4 5-16-inch bore and 4¾-inch stroke for models 56 and 57, and 4½-inch bore and 5-inch stroke for models 58 and 59. A constant level splash lubricating system is used, the oil supply being carried in a well at the bottom of the crankcase, the oil being pumped by a plunger pump driven from the camshaft into the four compartments of the crankcase. Thermo-syphon water circulation is used. The transmission is located on the rear axle housing and the clutch is a multiple-disk. On all but two of the models, 50 and 61, center control is used, the exceptions using the regulation right-hand control operating in an H sector.

COLBY

All of the Colby models—eight altogether—have been retained for this year and without changes of any particular note. On model H the gearset has been changed to one that is internally operated, the control set tube and shaft terminating in the gearset case. There also has



been a switch in body styles and the new body is metal with flush sides, fore-doors, door latches inside and 5 inches more room in the front seat on model H. The body on model L has been made a five-passenger foredoor affair, flush sided, with shroud over the dash and with the door latches inside. The Colby is a comparatively new car and has three sizes of motors—4.09 by 4.50, 4.13 by 5.25 and 4.25 by 5.25. They all are of the T-head type, the smallest one having its cylinders cast en bloc and the others in pairs.



The wheelbases range from 112 to 121 inches; a multiple-disk clutch is used on model H and a cone on L and J.

CUNNINGHAM

The same Cunningham chassis used last year has been retained, but model J is an addition to the line, being model H simplified. All the Cunningham features have been retained—the unit power plant with four points of support, long-stroke motor, valves in the head, offset cylinders and valves protected by dustproof caps. The Cunningham motor is rated at 40 horsepower with its four cylinders $4\frac{3}{4}$ by $5\frac{1}{4}$ inches, and water-cooled by a gear-driven centrifugal pump. Other mechanical features include a three-speed gear-set, leather-faced cone clutch, shaft drive, circulating splash lubrication, Bosch dual ignition and one set of spark plugs, 134-inch wheelbase, 36 by 5-inch tires with demountable rims, I-beam front axle, and Timken floating rear axle with Timken roller bearings throughout.

The Cunningham body line is most complete, including roadster, touring car and closed bodies. In the latter department one finds ambulances, limousine hearses and casket wagons. In the new model J an innovation is the auxiliary seats in the seven-passenger torpedo. There is no swinging arm and the seats do not swing, giving an extra 4 inches to the occupants of the tonneau seat. It is claimed that this type of seat enables a five-passenger of the smaller type to be converted into a seven-passenger without trouble and it is declared that this style of seat will come into popularity during the year.

Like others, the Cunningham has built its bodies to secure more room, while the upholstery is most luxurious.

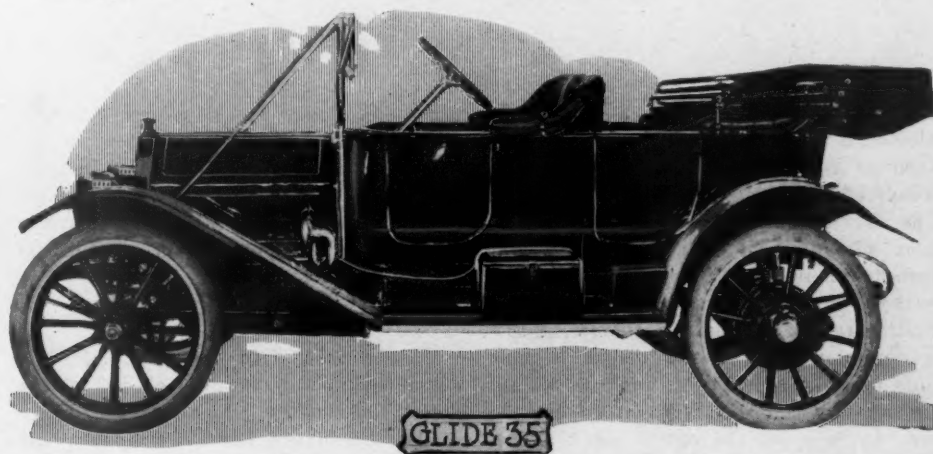
DAVIS

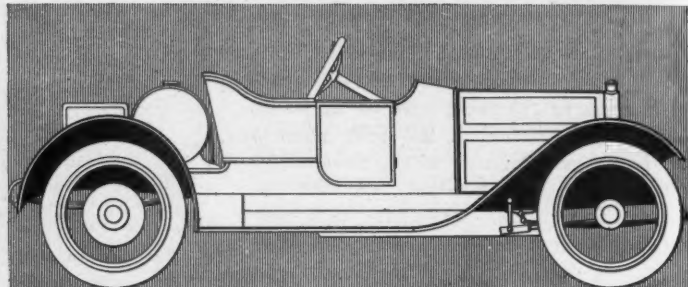
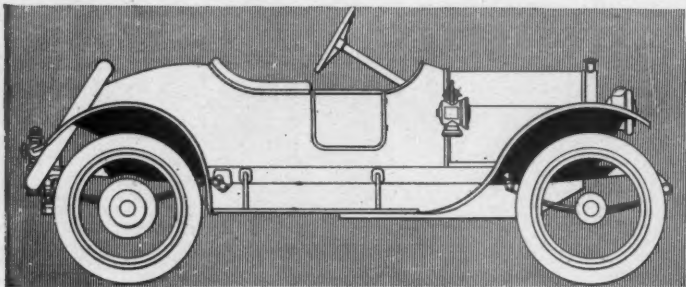
The Davis is using an en bloc Continental four-cylinder motor which has a bore of $4\frac{1}{8}$ inches and a stroke of $5\frac{1}{4}$, with valves inclosed and water-cooled by means of the centrifugal pump system, while oiling is accomplished by means of a gear-driven plunger pump operated from the camshaft. As is the case with many makes this year, the Davis has center control, which gives entrance from either side through fore-doors. The front axle is

an I-beam type and the rear floating, with double annular ball bearings in the hubs and Hyatt high-duty bearings in the differential. There are semi-elliptic springs in front and three-quarter platform in the rear, while the wheelbase is 112 inches and the tires 36 by 4. In body styles there are a five-passenger, a smaller five, a four-passenger and a roadster, all of the torpedo type.

FORD

Ford seldom makes changes in his construction and this year is no exception. There have been a few, though, as for instance, a change in the commutator con-

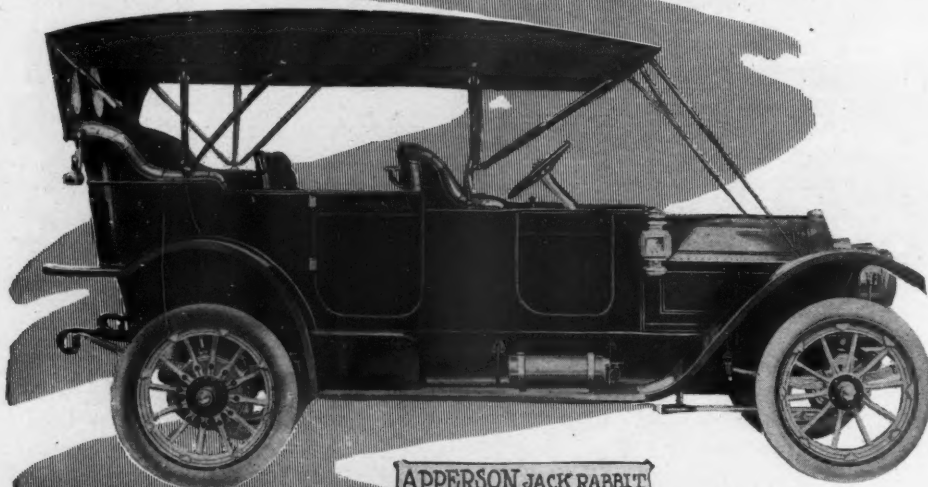




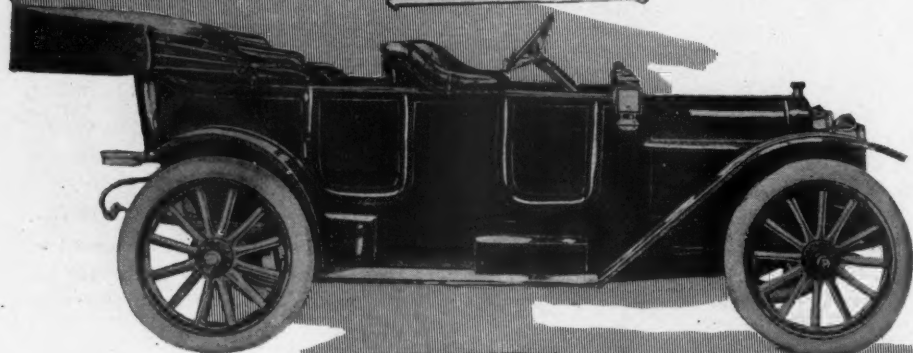
TWO ROADSTER TYPES—THE DAVIS AND MICHIGAN



LEXINGTON



APPERSON JACK RABBIT



HALLADAY 50

struction. Then, too, the rear axle is altered a bit. Now the wheels are fastened on with a taper and a locknut instead of a straight bearing and pin. The valves are inclosed and a door has been placed under the crankcase which permits of reaching the connecting rods without much trouble. Another accessibility reform has been a change in the transmission cover which makes it possible to make adjustments after removing six screws, whereas it formerly was necessary to take off the entire cover. The

usual Ford features are found—the flywheel magneto, the oiling system in the flywheel, left-hand control, and detachable cylinder heads in the en bloc four-cylinder motor. Then, too, transverse springs are used, which is an unusual construction.

GLIDE

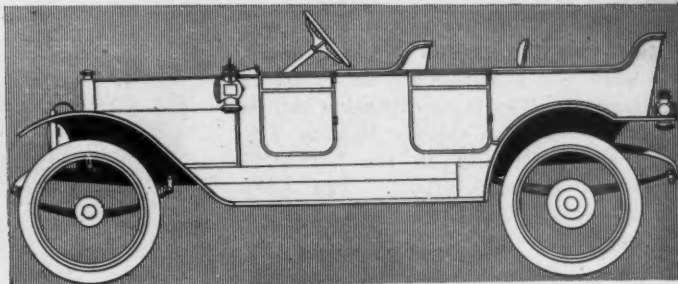
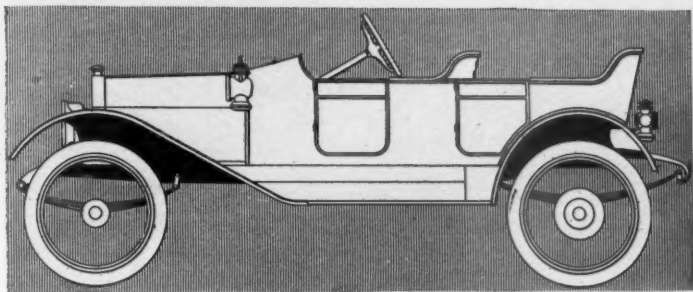
To the Glide line has been added a new model, a 35-horsepower chassis with a variety of bodies, which is built along smaller lines than the 45-horsepower car

of last year. In the new one the motor is $4\frac{1}{8}$ -inch bore and $5\frac{1}{4}$ -inch stroke, whereas the 45 has $4\frac{1}{4}$ by 5. The old motor had its cylinders cast separately, whereas the new one has them en bloc and has the valves on the left side and the inlet manifold is cast integrally with cylinder block. The exhaust manifold, water headers and carburetor connection are of cast iron, while the magneto and the centrifugal water pump are placed on the right side of the motor. There are three liberal plain crankshaft bearings and the same number and type on the camshaft, while there are four large connecting-rod bearings. There has been a slight change in the multiple-disk clutch, fourteen plates now being used, whereas there were but eleven last year. The wheelbase last year was 120; on the new model it is 114; 1911 wheels carried 36-inch tires and the new car has cut this to 34. Demountable rims are used.

In the body line the offering is a five-passenger foredoor touring car, the doors having inside latches. Another feature is left-hand steering, with the accompanying center control. There is a divided front seat with a goggle box between the spaces, while the tool space is found under the rear seat. All bright metal parts, including the accessories, are nickelplated, while other metal parts are finished in black enamel or oxidized.

HAVERS

Three models on one six-cylinder chassis are made by the Havers company, which features the fact that a self-starter is being used. The motor is $3\frac{3}{4}$ by 5 inches, with the valves inclosed by means of a housing cast integrally with the cylinder and covered by an aluminum cap held in place by a thumb nut. There is three-point suspension; two large feet cast integrally with the upper half of the case near the flywheel are supported on the frame, with the front of the motor supported on a cross member having a bearing surface 3 inches in diameter, $1\frac{1}{2}$ inch wide, which allows the motor to pivot when the car is being driven over rough roads. The front support is carried through the gearcase cover, which is a steel casting. With this construction the lower half of the case may be removed without disturbing any other part of the power plant. The clutch and transmission also may be removed without dis-



TWO PRATT-ELKHARTS, MODEL K FOUR-PASSENGER AND M, SEVEN-PASSENGER

turbing the working parts of the motor. The complete power plant may be removed after loosening six bolts. Other features of the Havers are: Multiple-disk clutch, splash lubrication, and control inside the body.

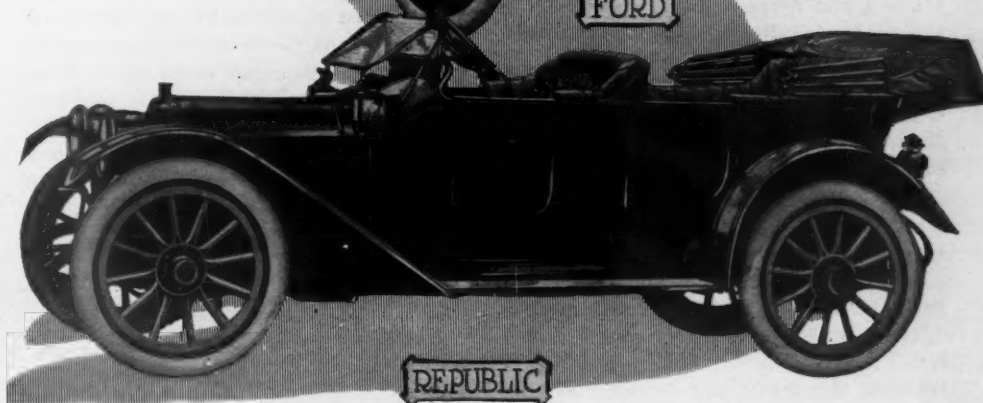
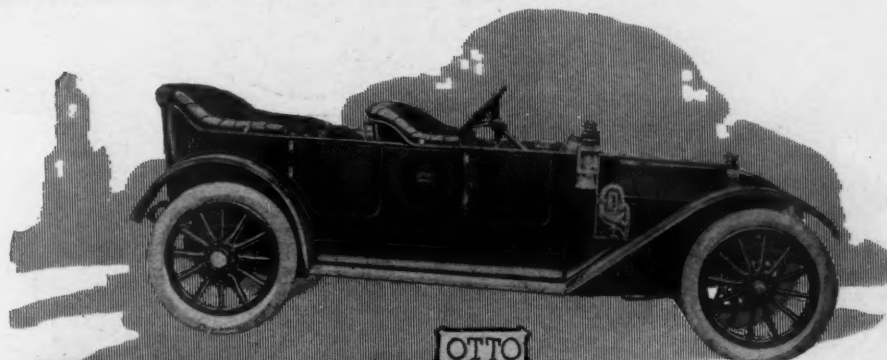
HALLADAY

In squaring away for the 1912 market the Halladay people decided to confine themselves to three models, one being a new one, the Halladay 30. Its mates are the Halladay 40 and Halladay 50, models J and G being dropped. In the 40 and 50 no changes whatsoever have been made, but the 30 is featured by a new en bloc Rutenber motor with $3\frac{3}{4}$ -inch bore and $5\frac{1}{4}$ -inch stroke with a three-bearing crankshaft. There is a centrifugal water pump and the clutch is of the cone type. The Halladay continues to use the Bosch magneto and Pfanstiehl coil, complete independent systems of ignition, but instead of fitting a four-unit dash coil with a low-tension timer there is a single-unit vibrating coil with distributor and timer. A self-starter is used. The body styles on the 30 and 40 include a five-passenger and a two-passenger.

Features of the 30 are a 112-inch wheelbase, Mott axles and a Warner transmission on a sub-frame amidships. Demountable rims are part of the equipment.

KISSELKAR

Adding a 40-horsepower chassis gives the Kisselkar a wide range, for the three models carried over from 1911 include a 30, 50 and 60, the last-named being a six-cylinder proposition. All four Kisselkars are built along the same lines, using the L type of motor, with the cylinders cast in pairs, circulating oiling system, leather-faced cone clutch; a three-speed gearset on the 30 and 40 and a four-speed on the other two; floating rear axles, internal and external brakes operating on the rear wheel drums; side members of the frame narrowed at the dash, which is a new feature and a continuation of the double drop frame. Motor changes are not many, but one change that has been made by having the exhaust and intake valve springs entirely inclosed by plates, which tends to quietness and at the same time gives a cleaner looking motor. A change is found in the ignition, Mea or Bosch dual being offered, the magneto being most accessibly mounted on a con-



tinuation of the pump shaft on the right side. It is secured by means of a set screw which carries a concave plate resting over the top of the center magnet. The screw passes through a bracket on the cylinder, and by raising the screw it is possible to slide the magneto out of position. The floating rear axle on all models has been made heavier. Tire sizes have been increased. The new 40 has a motor $4\frac{1}{2}$ by $4\frac{3}{4}$ inches and the wheelbase is 118 inches. The tire sizes are 35

by $4\frac{1}{2}$ all around. In addition to making pleasure cars, the Kissel company also devotes itself to the manufacture of commercial cars of all sizes and powers.

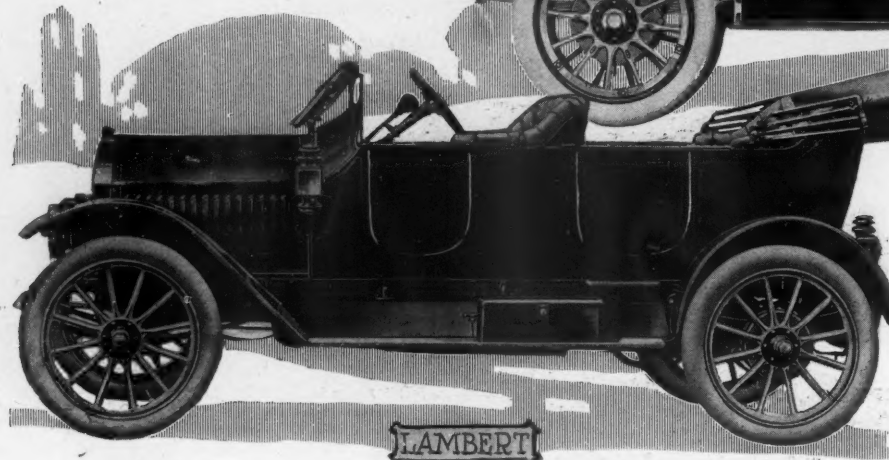
LEXINGTON

The Lexington has expanded its line for 1912 by the addition of two new chassis, one of which is a six-cylinder model, called the Perfect six, rated at 60 horsepower.

It has been the policy of the company

from season to season as was found consistent with the growth of the industry, and this year's models are no exception to the rule. The more expensive models are equipped with electric lighting systems and practically all the Lexington cars will be self-starting. The body changes on the four chassis make ten distinct cars.

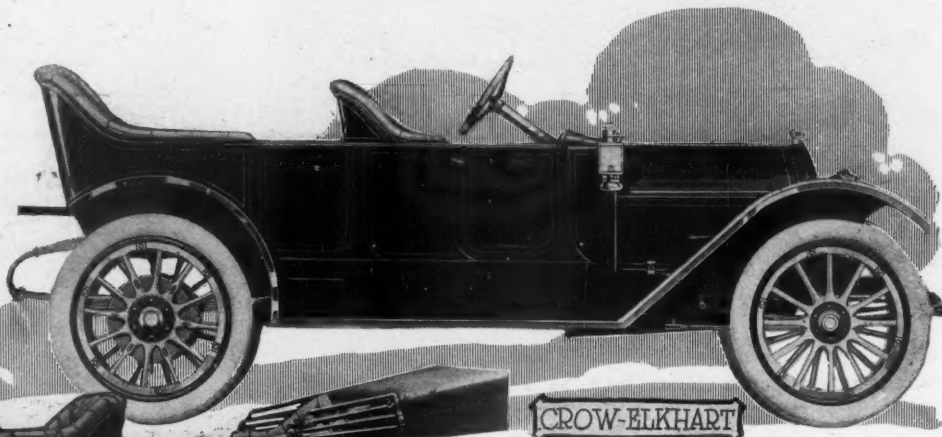
The Popular model has a four-cylinder



to make as many changes and refinements en bloc motor, $3\frac{3}{4}$ by $5\frac{1}{4}$, with a unit-power plant. The motor is unusually accessible with a detachable lower crankcase, aluminum cast. This chassis is equipped with touring car and roadster bodies and has a wheelbase of 116 inches. The Standard model is similar to the one offered last year and equipped with touring car, demi-tonneau and roadster bodies. It is equipped with Bosch double ignition system and has a wheelbase of 118 inches. The motor is $4\frac{1}{8}$ by $5\frac{1}{4}$. The Master model is likewise a refinement of last year, equipped with touring car, demi-tonneau and coupe bodies. This model is equipped with Bosch double system, the motor is $4\frac{1}{2}$ by 5, and wheelbase is 118 inches. The Perfect six is a this year's creation and is equipped with touring car, demi-tonneau and roadster bodies built on refined lines.

The Lexington six-cylinder chassis has a unit power plant with an accessible, well-housed motor of conventional design, equipped with Bosch double-ignition system, self-starting appliance and electric lighting system, with generator driven from the camshaft. Imported bearings are used throughout the transmission, the axle is a floating type and the springs are shackled and built into the frame. The motor is $4\frac{1}{8}$ by $5\frac{1}{4}$ and wheelbase is 133 inches. A Willard storage battery and a new type of generator are used for furnishing the lighting plant in this addition to the line.

The Popular model has been designed to sell at a popular price and is equipped with a $3\frac{3}{4}$ by $5\frac{1}{4}$ motor. It has a unit power plant with the lower crankcase and mud pan integrally cast and readily removable. The clutch is leather-faced, the



on 66-C. The foot control on the 1912 Lambert is somewhat similar to 1911. Now the pedals are globular in shape and are of a cycle type, passing forward and back through the footboard, operated by ankle movements. The depression of one releases the contact of the other, this being automatic. The friction contact is brought about by pushing forward on the friction or clutch pedal and when applied the foot pedals are held in place by an invisible ratchet.

MICHIGAN

Such talking points as a self-starter, 116-inch wheelbase, demountable rims, 34 by 4-inch tires, nickel mountings, three-bearing crankshaft and inclosed valves are found in the Michigan, which offers five models for 1912 fitted to two chassis, one of which is of 40 horsepower and the other 33. The former is known as model K and comes either as a five-passenger or a roadster, while H, E and D are the roadster types. All models have the self-starter and the fore-door torpedo type of body is used throughout. The Michigan people have been in the motor industry 2 years and for 30 years they have been manufacturing horse-drawn vehicles, which is being continued.

NORWALK

Making both a four and a six, the former with a $4\frac{1}{4}$ by $5\frac{1}{2}$ -inch motor and the latter with cylinders 4 by 5, the Norwalk

transmission is ball-bearing, and the rear axle semi-floating. It is equipped with the Remy dual ignition system and has a wheelbase of 116 inches. Like the other, it offers a variety of body styles of modern design.

LAMBERT

The Lambert only has five models this season, the leader of the line being 66-C, a light five-passenger. The other four models are along similar lines and vary according to body styles and passenger-carrying capacities. The Lambert friction drive still is retained. The motor is of 35 horsepower, with the cylinders cast en bloc and each $4\frac{1}{8}$ by $4\frac{1}{4}$ inches. A feature of the power transmission is the use of Renolds silent chain drive from the jackshaft to the rear axle, an idea which the Lambert people have used for 4 years. This chain is inclosed in a dust-tight metal case, which is removable. The various wheelbases are 115 on 99-A, 117 on 99-B, 112 on 99-C, 107 on 66-B and 112

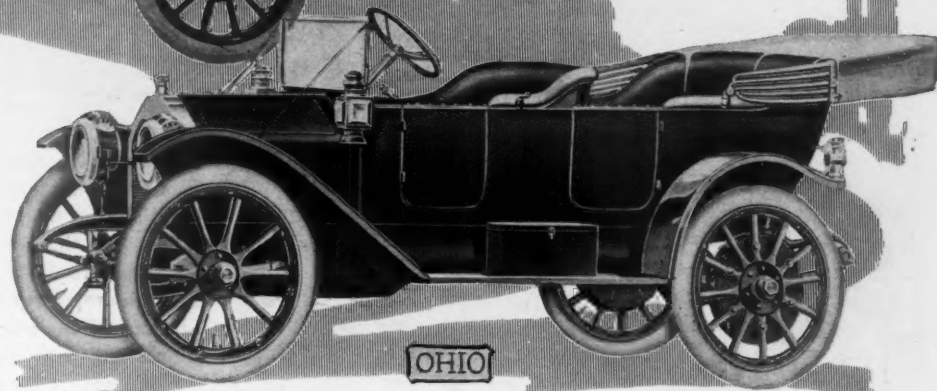




gives several body styles. The four motor has separately cast cylinders and the six casts them in pairs. Also on the six an underslung frame is used and all models are fitted with self-starter, lighting dynamo, top, windshield, slips, trunk and speedometer. Also demountable rims are used. On the four the wheelbase is 124 inches and 136 on the six.

OTTO

Such features as a self-starter, left-hand steer, center control, deep upholstery and a new motor are found in the Otto, while there are such little refinements as scrapers on the running board and cocoa mats on the running boards which can be turned up and locked in case of bad weather. Then there are a dynamo-magneto, demountable rims and the springs are protected by leather covers. The new motor is of the bloc type with $4\frac{1}{2}$ -inch bore and 5-inch stroke. The crankcase is made of aluminum alloy, divided horizontally, the upper half containing the complete crankshaft bearing. Camshafts and cams are inclosed in the crankcase and run in oil, while the intake pipes are aluminum and the exhaust cast iron. The water circulating pump is of the centrifugal type, with bronze runner and bronze bearings, while the oiling system is of the self-contained splash type, the oil being forced through a pipe, which is connected to a dash sight feed, by a plunger pump, the oil being discharged through four openings, which lead directly to the oil pockets into which the connecting rod dips. These pockets have outlet holes on



each side, which allow the oil to drain back into the reservoir so the oil remains at a constant level. The oil pump is connected directly to both forward and rear bearings by a copper tube, so whenever the engine is running oil is being pumped into these bearings. The wheelbase is 123 inches.

PRATT-ELKHART

One Pratt-Elkhart chassis is used and there are three models, a five-passenger touring car, a seven-passenger touring car and a four-passenger demi-tonneau. The motor used is a four-cylinder with $4\frac{1}{2}$ -inch bore and $4\frac{3}{4}$ -inch stroke and having an offset crankshaft and the valves inclosed. The unit power plant has a three-point suspension and the transmission is a three-speed selective. A centrifugal pump is used in the cooling system in connection with a Mercedes type of radiator, while the lubrication is effected by means of the constant level splash system. There is Bosch dual ignition and the clutch is of the cone type. The wheelbase is 120 inches and the wheels

36 by 4, using demountable rims. A Prest-O-Lite self-starter is part of the equipment.

REPUBLIC

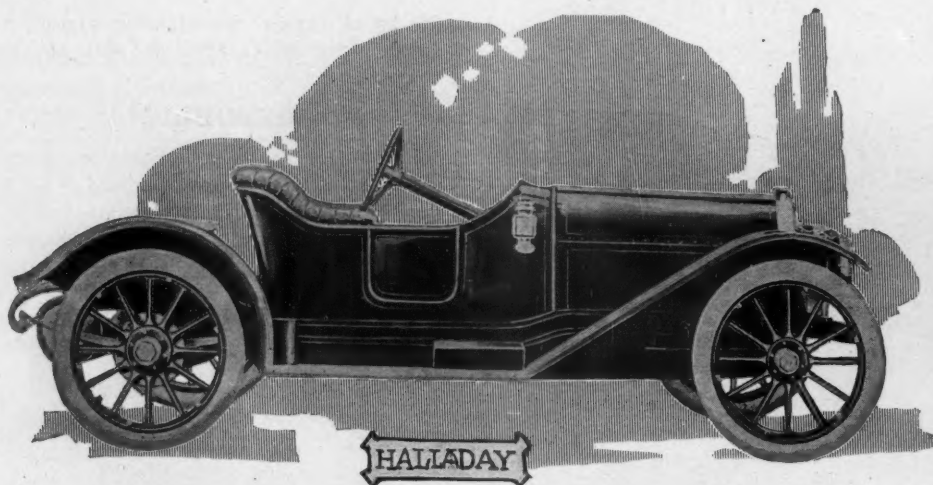
Up to this year the Republic company confined itself to a roadster and a touring car, but for 1912 it presents a four-passenger toy tonneau, which is known as model 113, all three using the same

chassis. While there have been practically no changes in motor, ignition, lubrication and clutch, there have been alteration in the gear-shifting mechanism, the rear axle and spring suspension. Center control now is used, the shifter control levers being fastened to a cross member of the frame. The construction of the sub-frame shows that the members are securely tied to the main frame by means of gusset plates, while the engine feet are raised for proper road clearance, the frame itself being placed in the lowest position possible. This allows the steering gear being placed on the sub-frame without interfering with the accessories of the engine. The steering gear is mounted with a bearing on either side.

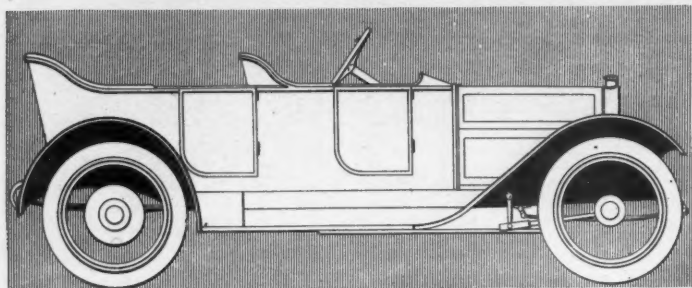
Instead of using a casting to fasten the upper half of the rear spring to the frame the rear gusset plate is extended to the frame itself. Aside from the two clips a $\frac{1}{2}$ -inch bolt holds the spring in position. The lower half of the spring is slung under the axle, which is done by inverting the spring saddle which allows the usual spring clearance with an unusually low-hung body. The spring pad is made with a large lip for holding the rebound straps, while all spring shackle bolts are furnished with castellated nuts which are cotter-pinned. The method of bringing about the brake rod suspension on the torque tube is by placing the supporting yoke on the same center as the rear axle, which allows for a close adjustment of brake bands, avoiding rattle without danger of grabbing brakes. It also places the rods entirely inside the chassis.

In addition to the four-passenger there also has been added a two-passenger torpedo roadster. A third passenger may be carried on a trundle emergency seat which pulls out on the left of the car, allowing





HALLADAY



MICHIGAN TOURING CAR WITH FORE-DOOR BODY

the third passenger to sit with his feet resting on the running board. When not in use, it folds up and pushes under the seat. The two seats are especially roomy, with seats set very low and the upholstering very deep. The torpedo rear opens so as to admit storage of an abundance of baggage. This car is built on the same chassis as the other models.

The passenger compartment of the roadster is ventilated by ventilators which are located in the windshield fillerboard, and the amount of air used may easily be regulated from the driver's seat. The control is in the center.

STAVER

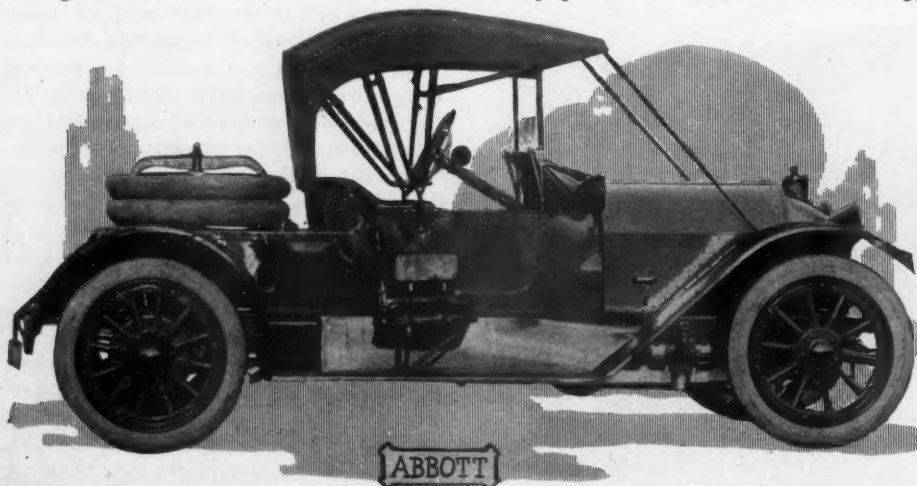
The Staver line for 1912 shows refinements in details and simplicity in construction. The frame of the five-passenger model has been changed to double drop, widened 2 inches and the wheelbase is lengthened to 120 inches. The car has

full annular bearings throughout the chassis and wheels except on the motor. The front axle is now a drop forged I-beam and the rear is of the usual floating type. The small motor is retained, but with minor changes tending towards in-

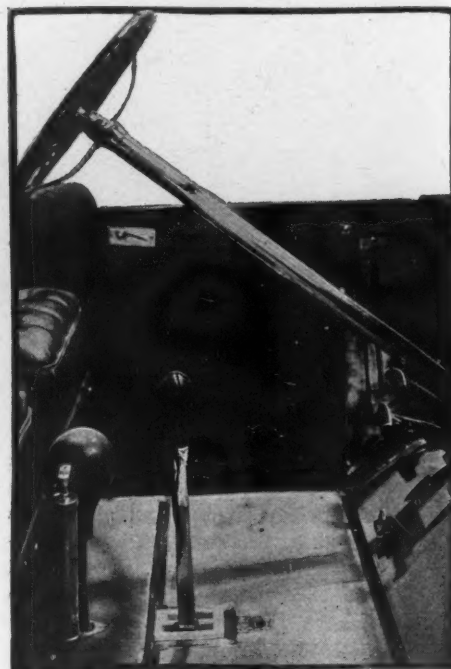
crease in horsepower. By extending the web of the crankcase to the subframe, the necessity of an under pan is done away with. A larger transmission is used. The brakes are internal, expanding in double drums of 16 and 12-inch diameter, and the drums are bolted to every alternate spoke in the rear wheel. Three-quarters elliptic springs—the rear being 52 inches long—provide an easy-riding car. The tires are 36 by 4, both front and rear, with demountable rims.

The body retains its straight-line effect, but is wider and roomier. Hand-buffed leather with increased depth provides a comfortable seat. A molding around the body furnishes an opportunity for finishing in contrasting shades of color. Walnut strips and nickel trimmings are used on all cars.

The new five-passenger model 35-F special is listed very complete in the way of equipment. Besides the usual top,



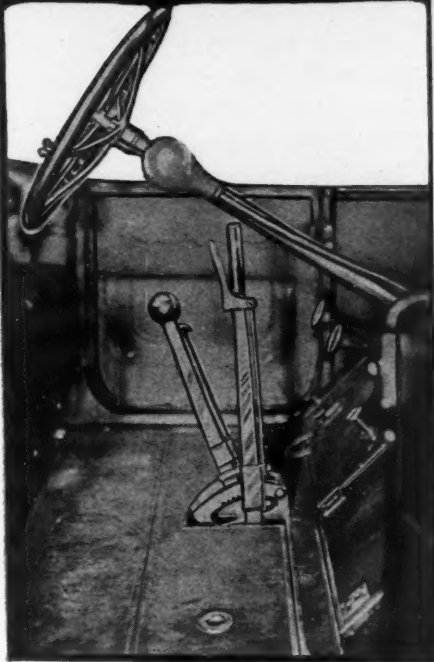
ABBOTT



CENTER CONTROL—HERRESHOFF AND PATERSON

glass front and speedometer, the extra rim is given together with an extra case, tube, tire cover and single tire irons. Even a bumper is furnished. Electric lights with the Remy generator and storage battery are features and a self-starter is installed at the customer's request. An innovation is the use of flush dash lamps and ventilators. These are so designed that the driver can direct the light in or out of the car at will.

The four-passenger racing roadster is continued, with 124-inch wheelbase, with larger lamps and wheels, and is also nickel trimmed. High-tension magneto and Schebler carbureter are the mechanical changes over the last season. Demountable rims and 36 by 4 tires are

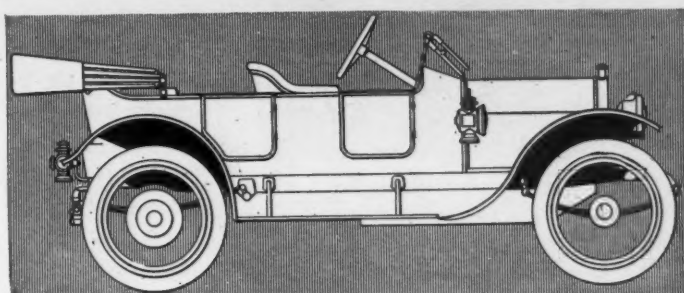
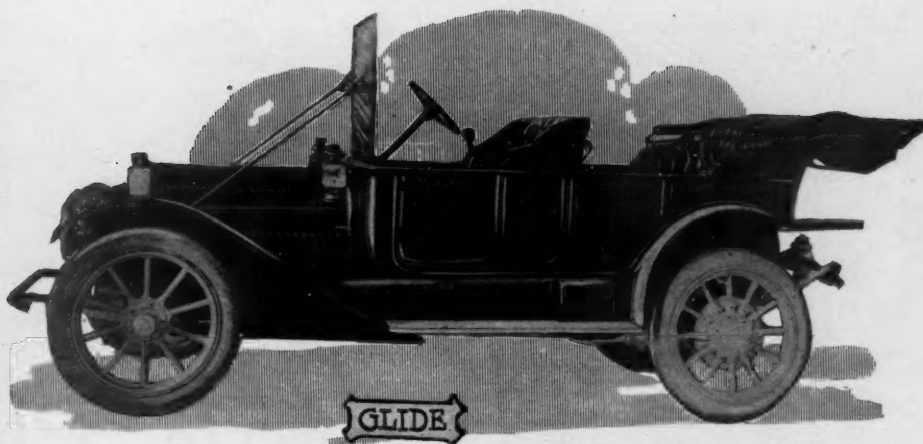


CENTER CONTROL—ABBOTT AND FIRESTONE

furnished. The four-passenger touring car and the roadster retain the same general characteristics as last year. Both are equipped with larger lamps and a 4-inch tire is now used instead of a 3½. The seven-passenger touring car is continued along the same lines as last season.

THE TREND

Glancing over the details of construction in the various makes of cars described in the foregoing, one does not discover anything radically different from those machines which were exhibited in the Madison Square garden show of the Automobile Board of Trade or the Grand Central palace exhibition of the National Association of Automobile Manufacturers. The main theme is about the same. We find, first of all, those who have depended



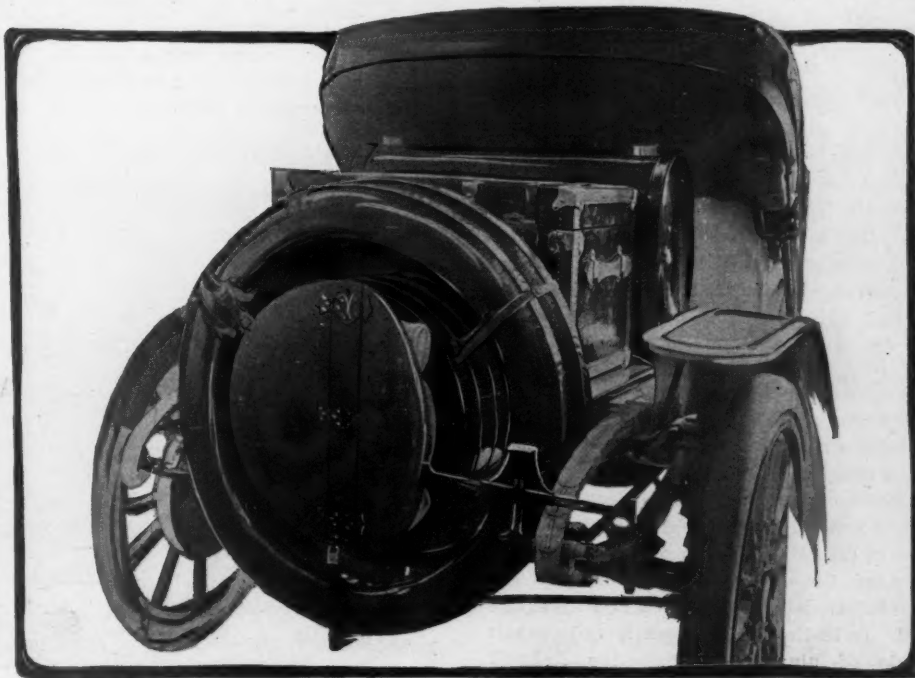
DAVIS FOUR-PASSENGER FORE-DOOR MODEL

upon the Chicago show alone as the medium through which they will reach the public have about the same idea as the other fellows as regards including in the list price such equipment as self-starter, top, demountable rims, speedometer

and other things which are thought to tend to making it easier to market the product.

Body styles also have come in for great consideration at the hands of rather minds of the designers. They have realized that the days when the purchaser was inclined to overlook the little things and permit of excuses being made are past and that now the buyer wants full value for his money. He wants a roomy car and one that is not freakish. He wants baggage-carrying facilities that will not make his car look like a prairie schooner following the overland trail; he wants comfort.

Therefore this has been the goal sought and in keeping with this we find a continuation of the fore-door body, with its ventilated front compartment; we find center control so that one may get in or out of the car from either side; we find left-hand steering in some cases; we find self-starters in order that labor may be minimized; we find demountable rims for the same reason. All the way through the trend is to give comfort and evidently comfort is to be had out of the new creations. The designer evidently has recognized that the days of faddism are over.



BAGGAGE-CARRYING FACILITIES ON THE OTTO



KIMBALL COUPE INTERIOR

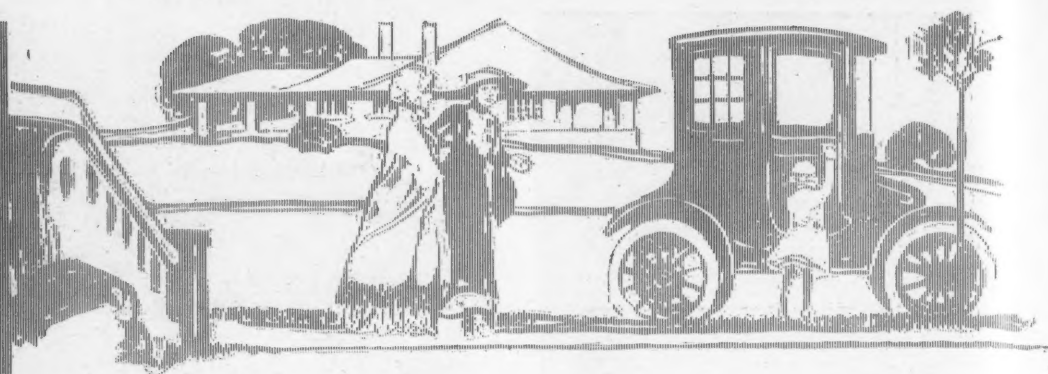
ARGO

A NEWCOMER is the Argo which is distinguished by its long, sweeping lines and its low-hung body, the latter being brought about by the motor being coupled closely to the differential through a herringbone gear drive, which allows the floor of the brougham to be set as low as the power plant instead of being over it. The Argo brougham has a wheelbase of 110 inches and 36 by 4-inch cushion tires, with pneumatics optional. The motor is a Westinghouse and the standard equipment calls for thirty cells, eleven-plate M V Exide battery, with Ironclad Exide and Edisons extra. The axles are tubular steel, front and rear, and the control is found in a right-hand pedal which operates a Cutler-Hammer controller, giving six speeds forward and six reverse. The brakes are internal expanding on the rear wheels. The weight is 3,200 pounds with lead batteries.

The body lines are graceful and the body is distinguished by its roominess. The rear seat is 44 inches wide by 20 inches deep; the front seat 43 by 18 inches and the space between 24 inches. The body has a wood frame, sheet metal panels and sheet steel hood and fenders. Steer is by wheel. In addition to the pleasure car a line of commercials also is turned out by the Argo people.

BABCOCK

Twelve models on six different chassis comprise the 1912 Babcock line, the wheelbase ranging from 78 to 105 inches. The Babcock still adheres to the double chain drive and now incloses the chains which run in oil. However, in order to meet the demand for direct shaft drive there are several models in the 1912 line so equipped. In bodies the Babcock has the panels made of aluminum, while the Renault type of hood is used on all models excepting the roadster and tourabout. The bat-



Electric Pleasure Car

MORE progress has been made in the electric car industry during the past year than in any previous season in that there have been more additions to the ranks of the makers of this type, the recruits including the Argo, Grinell, Standard, Flanders and the Century, while the Hupp-Yeats is of so recent an origin that it almost might be included in the count of 1911.

For the season which already has opened the trend in electrics shows that the makers have greatly refined their product. Bodies have been made much roomier than ever before and the effort to bring the car lower to the ground has resulted in the almost general adoption of the drop frame. The wheelbase, too, has been made longer and it might be safely said that the average now is about 92 inches.

tery equipment consists of Philadelphia high-capacity batteries. The Babcock uses foot control, the power being supplied through five speeds forward and a hand control lever or throttle which controls the power supply.

The dozen models cover a wide range. No. 17 is a large coupe seating five persons; No. 18 is a roadster with a folding rear seat; No. 19 is a coupe with drop windows; No. 20 a four-passenger coupe with two passengers facing backward; No. 5 is a two-passenger runabout; No. 6 a victoria; No. 10 a coupe which may be replaced by a victoria body and which has a folding seat for a third person; No. 14

a four-passenger brougham with a revolving front seat which allows the occupants to face forward, backward or sideways and which can be folded out of the way or removed; No. 16 is a five-passenger tourabout which looks like a gasoline machine; No. 11 is a town car.

BAILEY

While there are three styles of bodies listed for the Bailey—two runabouts and a phaeton—the company pushes the roadster type which is light in weight—2,400 pounds—and which is distinguished by a peculiar-shaped hood designed to reduce wind resistance and a suspension which





Changes and Tendencies

In keeping with the demand for more passenger-carrying capacity the five-seated coupe or what might be termed the electric limousine has come into great popularity. In this type the seats are so arranged that all passengers face forward, three being on the rear seat. The driver occupies an individual seat of his own, while the fifth person has a folding seat alongside the driver. The broughams have been made larger and the tendency to face the passengers forward is noticed here also.

There is more battery equipment and the makers are using more cells in proportion to the size of the car than they used to. The frames have been made stronger in keeping with this. Shaft drive is most pronounced and the chain drive now is usually an option.

differs from the conventional. On this car the center of gravity is less than 18 inches from the ground. The front end of the car is hung above and in the middle of a long cross spring extending lengthwise almost the entire length of the front axle, and this point of support, at which there is a ball-and-socket joint, is well above the center of gravity. For this method of suspension it is claimed that when swinging a corner the tendency is for the car to lean inward instead of outward. The position of the spring brings the weight upon the axle near its ends, which, it is said, stops side-swaying at the front end of the car. The ball-and-socket joint per-

mits easy oscillation of the front axle when one wheel is raised in passing over an obstacle. The rear of the chassis is hung from two points at top upon elliptic springs running lengthwise of the body and close to it. The frame is wood braced with steel.

The control is placed on the steering wheel and through the addition of a foot-throw switch there are eight forward speeds and four reverse. The brakes, two on the rear wheels and one on the motor, are separately connected and operated through foot levers. A General Electric motor is used and Edison batteries are the equipment.



OHIO COUPE INTERIOR

BORLAND

The Borland used to be the Ideal, the name having been changed since the last shows. Prominent in the 1912 line is the brougham which is had either with shaft drive or chain drive. In the bodies used on the chain-driven broughams no change has been made, the extension top and front and rear seats remaining unchanged. On the shaft-driven models, though, the bodies are 5 inches wider at the waist line and 4 inches longer over all. The front seating arrangement has a drop seat on the left side of the driver and either a stationary right front seat or a telescoping seat which allows the passenger to face forward.

The chain-driven model is the same as the shaft-driven one so far as the automatic current-breaker is concerned. This device compels the return of the control handle to neutral position before power again can be applied to the motor. The chassis has alloy steel springs, pressed steel frame, 80-volt motor, and F. & S. ball bearings throughout. The shaft-drive chassis has a 92-inch wheelbase, pressed steel frame, 80-volt General Electric motor hung on three-point suspension and connected with the driving shaft by a silent chain incased in a phosphor bronze housing and running in oil.

BROC

To the Broc line have been added three new models, while the five of 1911 are continued—the two-passenger roadster, the two-passenger stanhope, the two-passenger victoria, the three-passenger coupe and the four-passenger coupe. The additions are a four-passenger coupe, known as model 26; another four-passenger of larger dimensions known as model 28, and model 30, a six-passenger car of the French type. In the last-named model there is accommodation for three persons

SPECIFICATIONS OF AMERICAN ELECTRIC PLEASURE VEHICLES FOR 1912

Name and Model	Body Style	Price	Seats	Wheelbase	TIRES			BATTERY			Motor	Drive
					Kind	Front	Rear	Make and Number of Cells	Ampere Hr. Capacity	Mileage per Charge		
Argo, A	Brougham	\$2800	4	110	Cushion			Exide 30	60	60	Westinghouse	Gear
Babcock, 5	Runabout	1600	2	78	Pneumatic	32x3	32x3	Phila. 36	140	50	Diehl	Chain
Babcock, 6	Victoria	1900	2	78	Pneumatic	32x3½	32x3½	Phila. 36	140	50	Diehl	Chain
Babcock, 10	Coupe	2300	3	78	Pneumatic	32x3½	32x3½	Phila. 36	140	50	Diehl	Chain
Babcock, 12	Roadster	2400	2	94	Pneumatic	34x4	34x4	Phila. 42	140	60	Diehl	Chain
Babcock, 18	Roadster	2600	2	100	Pneumatic	34x4½	34x4½	Phila. 42	140	60	Diehl	Chain
Babcock, 14	Brougham	2600	4	86	Pneumatic	32x4	32x4	Phila. 36	140	50	Diehl	Chain
Babcock, 17	Coupe	2900	4	86	Pneumatic	32x4½	32x4½	Phila. 36	140	50	Diehl	Chain
Babcock, 13	Coupe	2900	3	94	Pneumatic	34x4	34x4	Phila. 42	140	60	Diehl	Chain
Babcock, 19	Coupe	3000	3	100	Pneumatic	34x4½	34x4½	Phila. 42	140	60	Diehl	Chain
Babcock, 20	Coupe	3200	4	105	Pneumatic	34x4½	34x4½	Phila. 42	140	60	Diehl	Chain
Babcock, 11	Town car	3250	5	105	Pneumatic	32x4½	32x4½	Phila. 42	140	60	Diehl	Chain
Babcock, 16	Tourabout	3800	5	105	Pneumatic	34x4½	34x4½	Phila. 42	140	60	Diehl	Chain
Bailey	Roadster	2500	2	106	Pneumatic	32x3½	32x3½	Edison 50-80	150-250	80-120	Gen. Electric	Chain
Bailey, 1912	Phaeton	2600	3	81	Pneumatic	34x3½	34x3½	Edison 54	150	125	Gen. Electric	Chain
Bailey	Roadster	2900	4	126		34x4	34x4	Edison 60	225	200	Gen. Electric	Chain
Baker, W	Runabout	2000	2	80				Exide, 30			Gen. Electric	Chain
Baker, V	Coupe	2700	4	80	Optional	Optional	Optional	Exide, 30	135		Gen. Electric	Chain
Baker, V	Victoria	2000	2	80	Optional	Optional	Optional	Exide, 30	112		Gen. Electric	Chain
Baker	Brougham	3100	4	92	Optional	Optional	Optional	Exide, 42	135		Gen. Electric	Chain
Baker	Brougham	3500	4	107	Optional	Optional	Optional	Exide, 42	135		Gen. Electric	Chain
Borland	Brougham	2500	4	92	Cushion	32x3½	34x3½	Exide, 40	128	75	Gen. Electric	Chain
Borland	Brougham	2200	4	92	Cushion	32x3½	34x3½	Exide, 40	128	75	Westinghouse	Chain
Broce, 20	Stanhope	2000	2	85	Optional	Optional	Optional	Exide, 28			Gen. Electric	Opt.
Broce, 21	Victoria	2050	2	85	Optional	Optional	Optional	Exide, 28			Gen. Electric	Opt.
Broce, 19	Roadster	2100	2	85	Optional	Optional	Optional	Exide, 30			Gen. Electric	Opt.
Broce, 22	Coupe	2300	3	85	Optional	Optional	Optional	Exide, 28			Gen. Electric	Opt.
Broce, 24	Coupe	2400	4	85	Optional	Optional	Optional	Exide, 28			Gen. Electric	Opt.
Broce, 26	Coupe	2600	4	85	Optional	Optional	Optional	Exide, 30			Gen. Electric	Opt.
Broce, 28	Brougham	2900	4	95	Optional	Optional	Optional	Exide, 40			Westinghouse	Chain
Broce, 30	Brougham	3200	6	100	Optional	Optional	Optional	Exide, 40			Westinghouse	Chain
Century	Roadster	1750	2	92	Pneumatic	36x3½	36x3½	Lead, 30	165	75-100	Westinghouse	Chain
Century	Brougham	1950	5	92	Cushion	36x4	36x4	Lead, 30	165	75-100	Westinghouse	Chain
Columbus, 1222	Coupe		4	83	Pneumatic	34x3½	34x3½	Exide, 30		65-85	Gen. Electric	Chain
Columbus, 1220	Coupe		4	92	Pneumatic	34x4	34x4	Exide, 30		65-85	Gen. Electric	Chain
Columbus, 1250	Coupe		5	100	Pneumatic	34x4	34x4	Exide, 36		65-85	Gen. Electric	Chain
Detroit, 32	Victoria	2000	2	85	Optional	Optional	Optional	Lead, 38		65-100	Own	Chain
Detroit, 14	Victoria	2200	4	85	Optional	Optional	Optional	Lead, 38		65-100	Own	Chain
Detroit, 30	Roadster	2200	2	96	Optional	Optional	Optional	Lead, 38		65-100	Own	Chain
Detroit, 31	Coupe	2600	2	96	Optional	Optional	Optional	Lead, 38		65-100	Own	Chain
Detroit, 27	Brougham	2700	4	85	Optional	Optional	Optional	Lead, 38		65-100	Own	Chain
Detroit, 25	Brougham	2800	4	90	Optional	Optional	Optional	Lead, 38		140	Own	Chain
Detroit, 26	Brougham	2800	4	90	Optional	Optional	Optional	Lead, 38		140	Own	Chain
Detroit, 28	Towncar	3500	7	112	Pneumatic	34x4	34x4	Lead, 38		50-75	Own	Chain
Detroit, 29	Limousine	3850	7	112	Pneumatic	34x4	34x4	Lead, 38		50-75	Own	Chain
Flanders	Coupe		4	100	Pneumatic	32x3½	32x3½	Lead, 24	140			
Fritchle	Victoria	2000	2	86	Pneumatic	34x3½	34x3½	Own, 28	120	100	Own	Chain
Fritchle	Roadster	2100	2	88	Pneumatic	34x3½	34x3½	Own, 28	120	100	Own	Chain
Fritchle	Touring	2400	4	100	Pneumatic	34x3½	34x3½	Own, 32	140		Own	Chain
Fritchle	Coupe	3000	4	88	Pneumatic	34x3½	34x3½	Own, 32	140	85-90	Own	Chain
Grimmell, H	Coupe		4	90	Cushion					80-90	Westinghouse	
Grimmell, C	Coupe		4	90	Cushion					80-90	Westinghouse	
Grimmell, K	Coupe		5	92	Cushion					80-90	Westinghouse	
Hupp-Yeates, Regent	Coupe	1750	4	86	Pneumatic	33x4	33x4	Exide, 27		75	Westinghouse	Gear
Hupp-Yeates, Regina	Coupe	2500	4	86	Pneumatic	33x4	33x4	Exide, 27		75	Westinghouse	Gear
Hupp-Yeates, Patricia	Coupe	3000	4	100	Pneumatic	33x4	33x4	Optional, 30		100	Westinghouse	Gear
Hupp-Yeates, DeLuxe	Coupe	4000	4	100	Pneumatic	33x4	33x4	Exide, 27		75	Westinghouse	Gear
Hupp-Yeates, Royal	Limousine	4500	5	100	Pneumatic	33x4	33x4	Exide, 27		75	Westinghouse	Gear
Hupp-Yeates, Imperial	Limousine	5000	5	100	Pneumatic	33x4	33x4	Exide, 27		75	Westinghouse	Gear
Kimball, Regular	Coupe	3000	4	82	Solid	36x4	36x4	Exide, 42			Gen. Electric	Opt.
Ohio, F	Victoria	2300	4	90	Optional	34x4	34x4	Exide, 30		90-130	Gen. Electric	Opt.
Ohio, Q	Victoria	2400	4	90	Optional	34x4	34x4	Exide, 30		100	Gen. Electric	Opt.
Ohio, D	Coupe	2600	4	80	Optional	34x4	34x4	Exide, 30		85-125	Gen. Electric	Opt.
Ohio, G	Coupe	2700	4	90	Optional	34x4	34x4	Exide, 30		85-125	Gen. Electric	Opt.
Ohio, K	Brougham	2900	5	90	Optional	34x4	34x4	Exide, 32		100	Gen. Electric	Opt.
Ohio, X	Coupe	4000	6	102	Optional	36x4½	36x4½	Exide, 41		100	Gen. Electric	Opt.
Rauch & Lang, 41	Stanhope or Vict.	2100	2	83½	Pneumatic	32x3½	32x3½	Exide, 24				
Rauch & Lang, 425	Stanhope or Vict.	2350	2	83½	Optional	Optional	Optional	Exide, 40				
Rauch & Lang, 41	Coupe	2400	4	83½	Pneumatic	32x3½	32x3½	Exide, 24				
Rauch & Lang, 43	Coupe	2550	4	83½	Optional	Optional	Optional	Exide, 24				
Rauch & Lang, 444 & 445	Roadster	2800	2	91	Optional	34x4	34x4	Exide, 40				
Rauch & Lang, 425	Coupe	2650	4	83½	Optional	Optional	Optional	Exide, 40				
Rauch & Lang, 43	Demi-Brougham	2700	2	83½	Optional	Optional	Optional	Exide, 24				
Rauch & Lang, 425	Demi-Brougham	2800	2	83½	Optional	Optional	Optional	Exide, 40				
Rauch & Lang, 44 & 45	Brougham	2800	4	91	Optional	Optional	Optional	Exide, 24				
Rauch & Lang, 444 & 445	Roadster	2800	2	91	Optional	34x4	34x4	Exide, 40				
Rauch & Lang, 444 & 445	Brougham	2900	4	91	Optional	Optional	Optional	Exide, 40				
Rauch & Lang, 44 & 45	Landaulet	3000		91	Optional	Optional	Optional	Exide, 24				
Rauch & Lang, 444 & 445	Landaulet	3100		91	Optional	Optional	Optional	Exide, 40				
Rauch & Lang, 454 & 455	Coach	3800	4	109	Optional	Optional	Optional	Exide, 40				
Standard, M	Coupe	1850	4	91	Optional	Optional	Optional	Exide, 30	135	90	Westinghouse	Opt.
Studebaker, 17-K	Coupe	1750	4	74	Optional	31x4	31x4	Exide, 32	112	50-60	Westinghouse	Chain
Studebaker, 17	Landaulet		3	74	Optional	31x4	31x4	Exide, 32	112	50-60	Westinghouse	Chain
Studebaker, 17	Phaeton		4	74	Optional	31x4	31x4	Exide, 32	112	50-60	Westinghouse	Chain
Studebaker, 22	Runabout	900	2	67	Pneumatic	30x..	30x..	Exide, 24				Chain
Studebaker, 22	Stanhope	950	2	67	Pneumatic	30x..	30x..	Exide, 24				Chain
Studebaker, 22	Coupe	1200	4	67	Pneumatic	30x..	30x..	Exide, 24				Chain
Studebaker, 22	Coupe	1850	4	67	Pneumatic	30x..	30x..	Exide, 24				Chain
Waverley, 96	Victoria Phaeton	1850	3	89	Optional	Optional	Optional	Exide, 32	120	70-80	Own	Chain
Waverley, 90	Roadster	2000	3	104	Optional	Optional	Optional	Exide, 32	135	75-90	Own	Chain
Waverley, 93	Coupe	2150	3	89	Optional	Optional	Optional	Exide, 32	120	70-80	Own	Chain
Waverley, 91	Brougham	2800	4	89	Optional	Optional	Optional	Exide, 32	135	70-80	Own	Chain
Waverley, 88	Limousine	3500	5	104	Optional	34x4	34x4	Exide, 34	158	70-80	Own	Chain
Woods, 1316	Brougham	3000	5	90	Cushion	32x..	34x..	Exide, 40			Own	Chain

on the rear seat, two on the front and an extra seat for the sixth passenger. In the way of refinements in the new models, it is noted that sufficient head room is provided so that millinery is not damaged by being rubbed against the roof. The car door itself has been made wider and now is 24 inches. All sashes are cloth-covered and the seat upholstery is 8 inches deep. All models are low-hung, with the weight of the batteries distributed evenly in front and rear. Three-quarter elliptic rear suspension is used, which eliminates torque and radius rods. Headlights also are furnished on models 28 and 30.

Each of the new models has a different length of wheelbase—85 on the 26, 95 on the 28 and 100 on the 30. The 28 has a 50-inch tread and the other two 26. Broc uses shaft-drive transmission through beveled gears in the rear axle, but also gives an option on the inclosed chain.

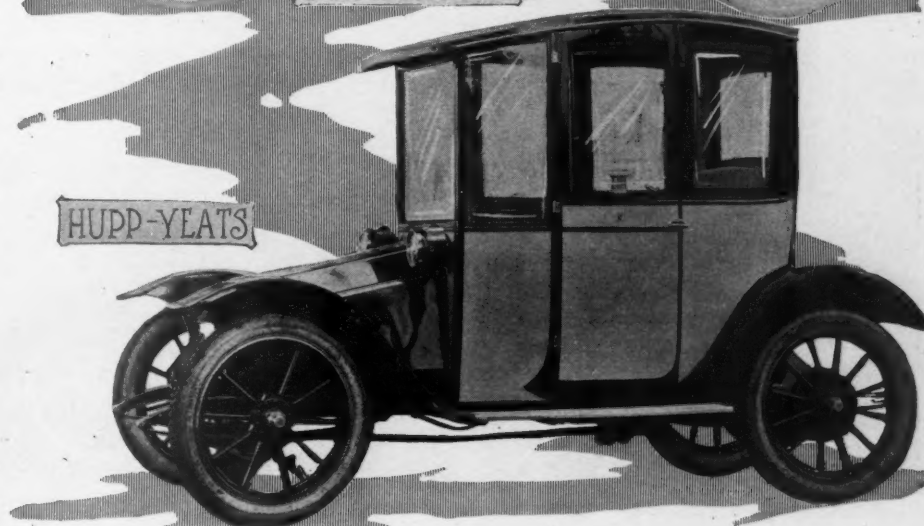
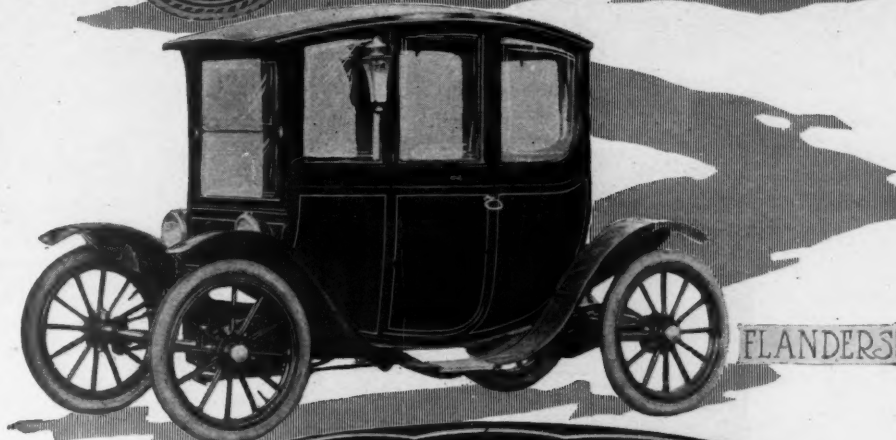
BAKER

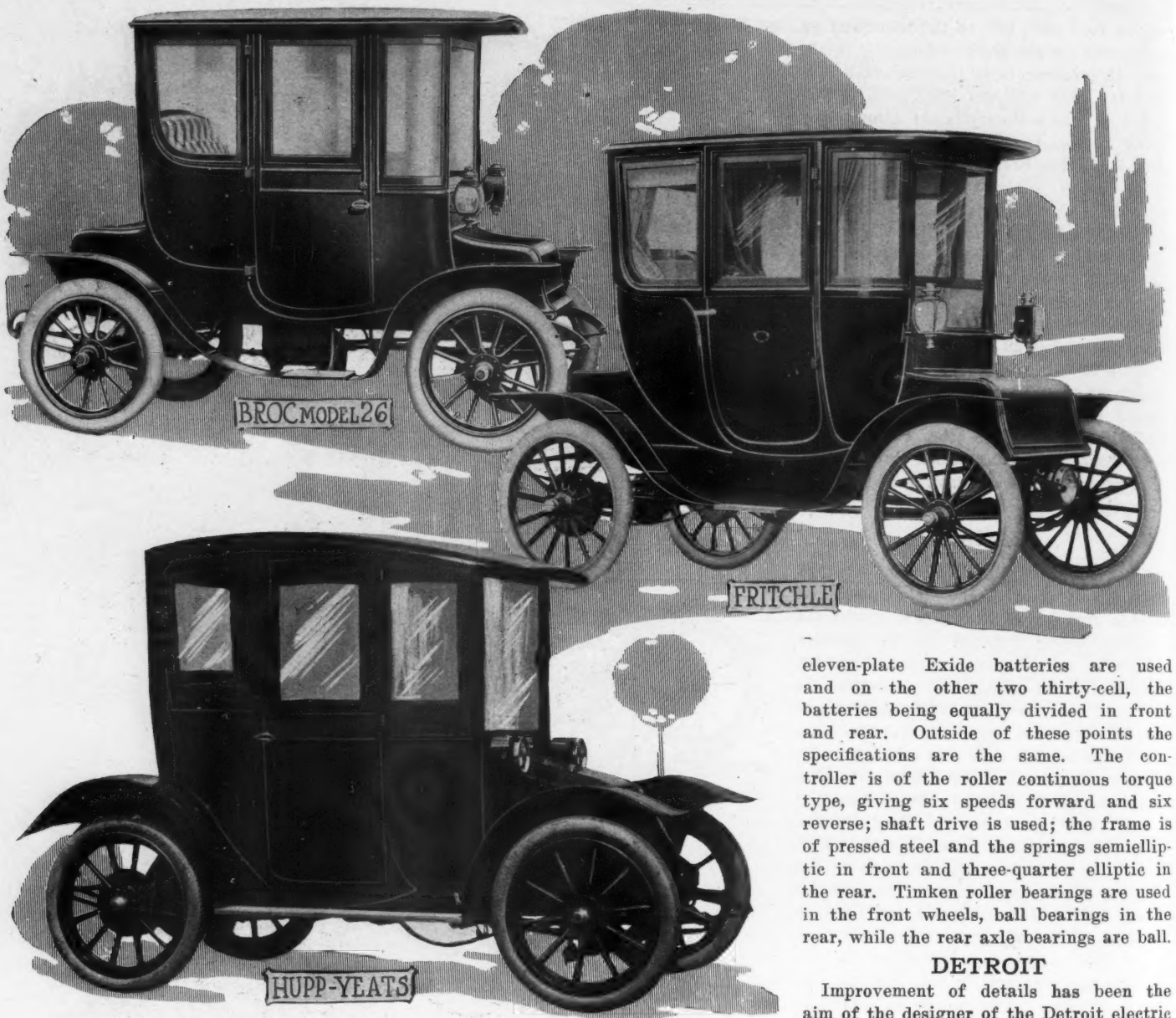
The model W Baker runabout is the 1912 development of the Baker company, and is found with fore-doors, windshield and top, being designed for the business man who is seeking more speed and greater mileage than usually is had in electrics. It is noted that the seat is not divided as was the case last year, giving more room to the occupants. The upholstery is in leather. Besides this there is an extension coupe in which the seats which face the driver have higher backs. The third one of the Baker family is a victoria which has the same chassis specifications as the coupe and runabout. These three are the Baker leaders for 1912, although the line includes other body types.

On this chassis the wheelbase is 80 inches; the rear axle is semi-floating, the front tubular. The motor is four-pole series wound and of Baker design, while the transmission is by silent chain which is inclosed. The controller is of the continuous torque drum type and the 32-inch wheels carry either solids or pneumatics. On the runabout a steering wheel is used; on the others the side lever.

CENTURY

The Century electric is one of the most recent additions to the industry and the Detroit plant has turned out a chassis which carries either a two-passenger roadster or a five-passenger brougham. The aim has been to get out of the beaten path, as is shown by a study of the specifications, which show roominess, big road clearance and big wheels. In the brougham the rear seats are 46 inches wide and 21 inches deep; the front seats are 41 by 18, while there is 24 inches room between the two seats. Eight-inch rear cushions are fitted and the upholstery runs around the sides. The wheels carry cushion tires 36 by 4 inches and there is a 12-inch road clearance provided. Other features of the car include a battery made up of thirty thirteen-plate cells, 92-inch wheelbase, pressed steel frame, ball-and-socket support for the motor, storage space





under the front seat, drum type of controller and double internal brakes. There is side lever steer.

COLUMBUS

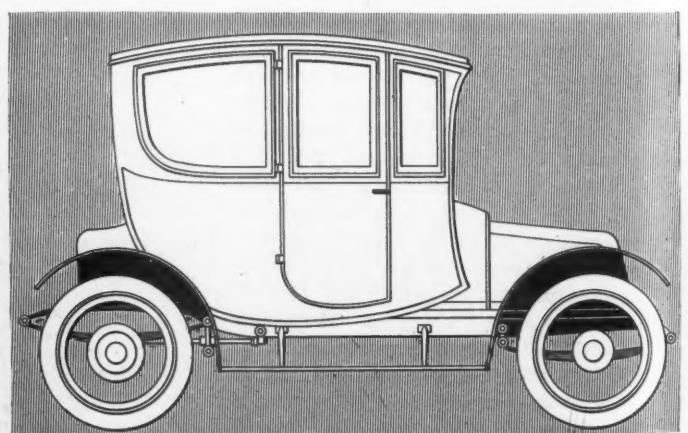
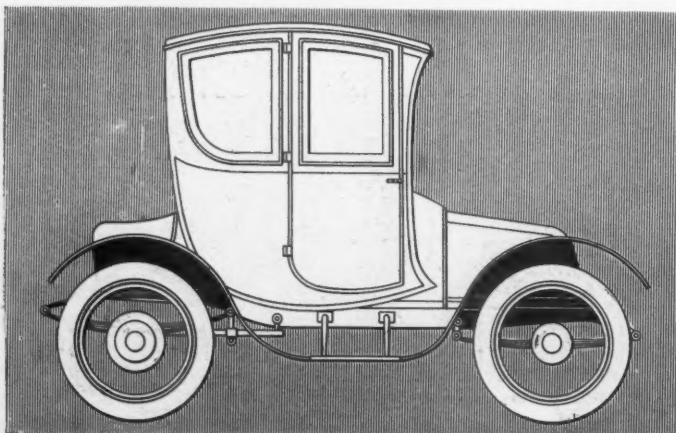
New in the Columbus line is a five-passenger colonial coupe which has a 100-inch wheelbase, 34 by 4-inch pneumatic

tires, side lever steer and which is featured by having all five occupants face forward. The Columbus people use the General Electric motor of the 60-volt type on the big car and 48-volt on the other two coupes which complete their line. The two last named are of 4-passenger capacity. On the colonial coupe thirty-six cell

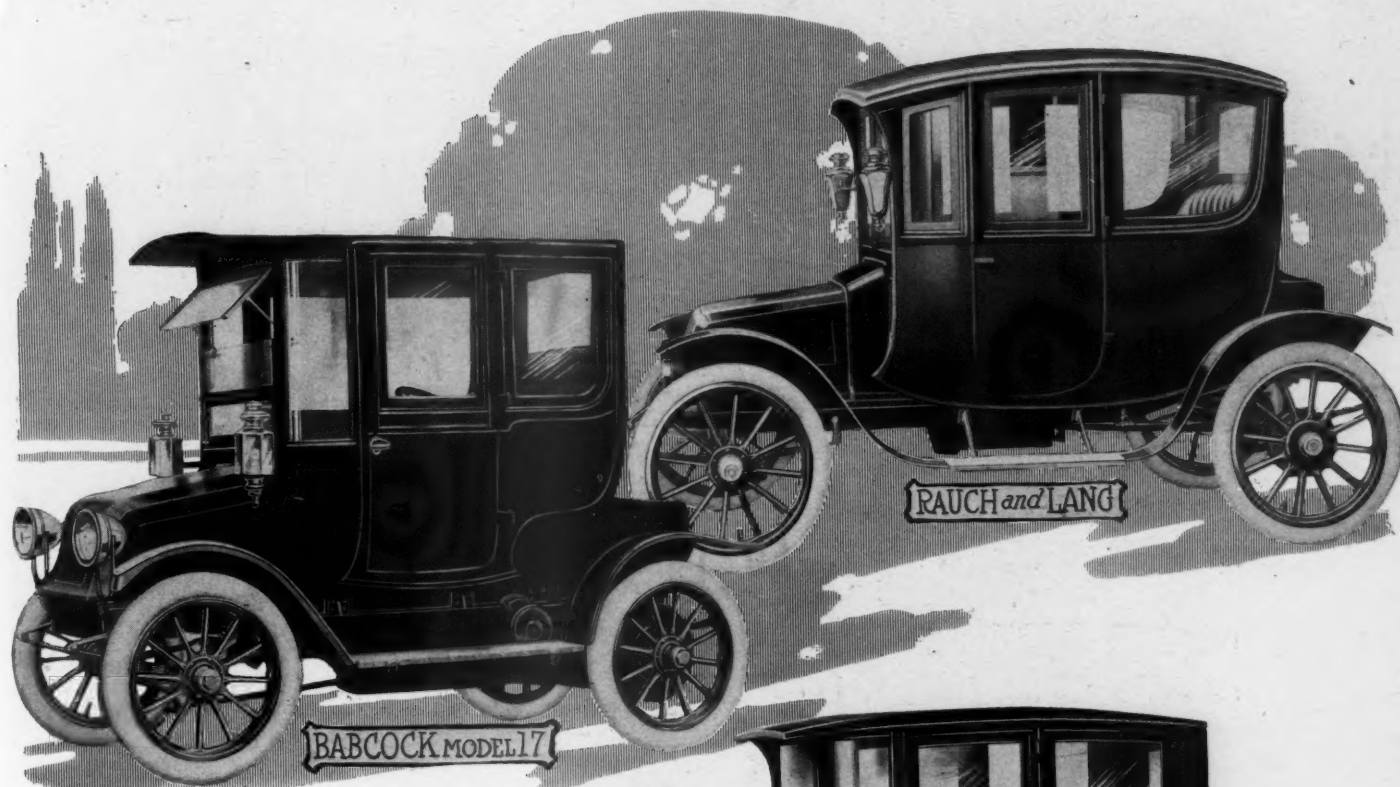
eleven-plate Exide batteries are used and on the other two thirty-cell, the batteries being equally divided in front and rear. Outside of these points the specifications are the same. The controller is of the roller continuous torque type, giving six speeds forward and six reverse; shaft drive is used; the frame is of pressed steel and the springs semielliptic in front and three-quarter elliptic in the rear. Timken roller bearings are used in the front wheels, ball bearings in the rear, while the rear axle bearings are ball.

DETROIT

Improvement of details has been the aim of the designer of the Detroit electric for 1912 and no radical mechanical changes are noted. The one shaft-driven chassis is built in four sizes with wheelbases of 85, 90, 96, and 112 inches. With the exception of the difference in size, the design and construction of each chassis model is identical. The line consists of model 25, an extension brougham; model 26, extension brougham; model 27, brougham; model



TWO RAUCH & LANGS—FRENCH COACH AND CLUB ROADSTER

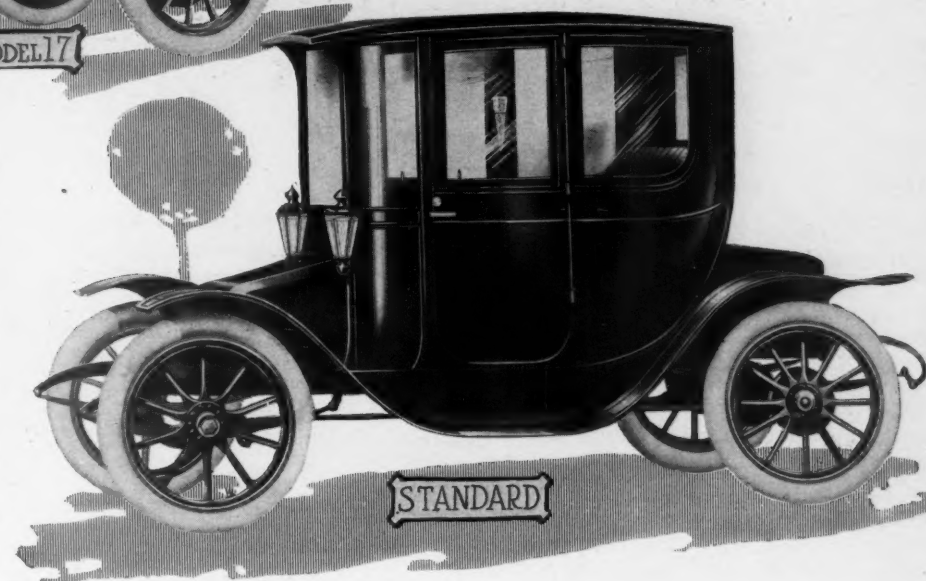


28, town car; model 29, limousine; model 30, roadster; model 31, two-passenger coupe with seat for third passenger; model 32, victoria; model 14, four-passenger victoria. The Detroit limousine carries six persons, four in the rear compartment. The wheelbase is 112 inches.

A moderate speed motor is used which makes 800 revolutions per minute, which is suspended to the chassis frame slightly forward of the car center. This not only removes the motor weight from the rear axle, but places the main propulsive effort at a point where maximum steadiness, ease of motion and stability are had, it is claimed. Moving parts are protected from dirt and dust and all wiring is inclosed in conduits. The frame is of pressed steel and has a 4-inch drop.

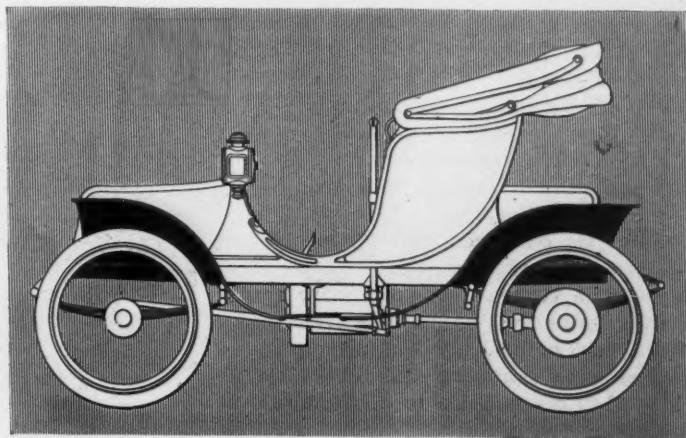
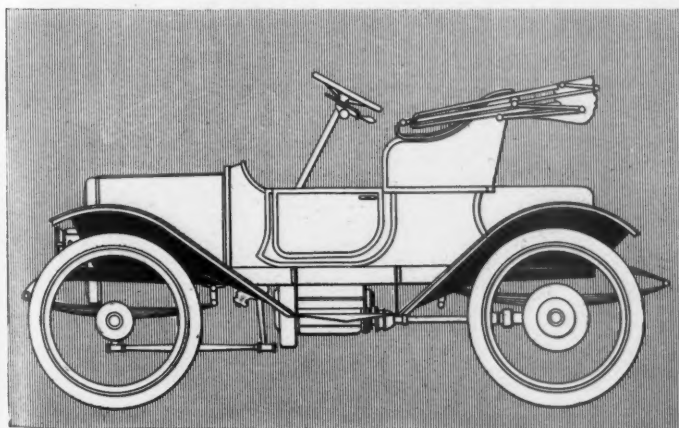
FRITCHLE

The Fritchle, a Denver-made electric, is not in the big shows. It is made in four models, including a torpedo touring car, a



torpedo roadster, a victoria and a coupe. The touring car has a 100-inch wheelbase, the coupe and roadster 88 and the victoria 86. Pneumatic tires, 34 by 3½, are used, and the battery is the company's own make, twenty-eight cells being used

on victoria and roadster and thirty-two on the others. The Fritchle motor is used and the controller is of the drum type, giving six speeds forward and as many reverse. Shaft drive is employed. The service brakes are of the contracting band



TWO BAKER ELECTRICS—RUNABOUT AND VICTORIA



type and the emergency expanding on the rear hub. Elliptic springs are fitted front and rear and the steering is done by means of a side lever.

FLANDERS

The Flanders electric, which makes its initial appearance for the season of 1912, is as simple and unique in design and construction as it is a radical departure from the conventional. Its chief characteristics are a low-hung colonial coupe body, mounted on a pressed steel drop frame of channel section; an unusual cradle spring suspension; worm drive, with the driving worm on the armature of the motor, and the motor in unit with the semi-floating rear axle; automatic electric control giving six forward speeds and two reverse and which can be operated with the thumb and forefinger; twenty-four cells of batteries of 140-ampere-hours' capacity, located under the front seat; a 100-inch wheelbase and pneumatic tires.

The driving worm of this car is secured direct to the armature shaft, eliminating the use of universal joints and all noise and power losses that might arise therefrom. The battery is divided into four trays of six cells each; and the front of the car opens to permit easy escape of gases when charging and to remove the trays when necessary. The cells are fitted with special automatic valves in the plugs so that it is unnecessary to remove the plugs when charging the battery. A rubber mat under the seat cushions prevents gases entering the car.

The Flanders controller is operated by a small independent motor by means of which the car will start gradually, regardless of the advanced position in which it may be set, and the controller can not change from one position to another in less than a certain predetermined time. It is operated by simply turning a corrugated hard rubber knob.

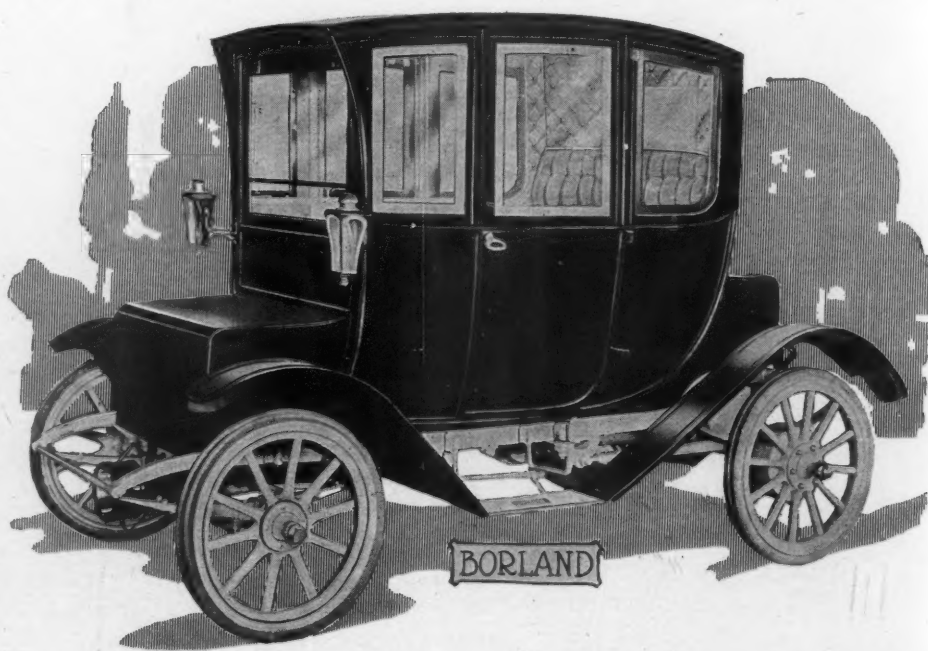
GRINNELL

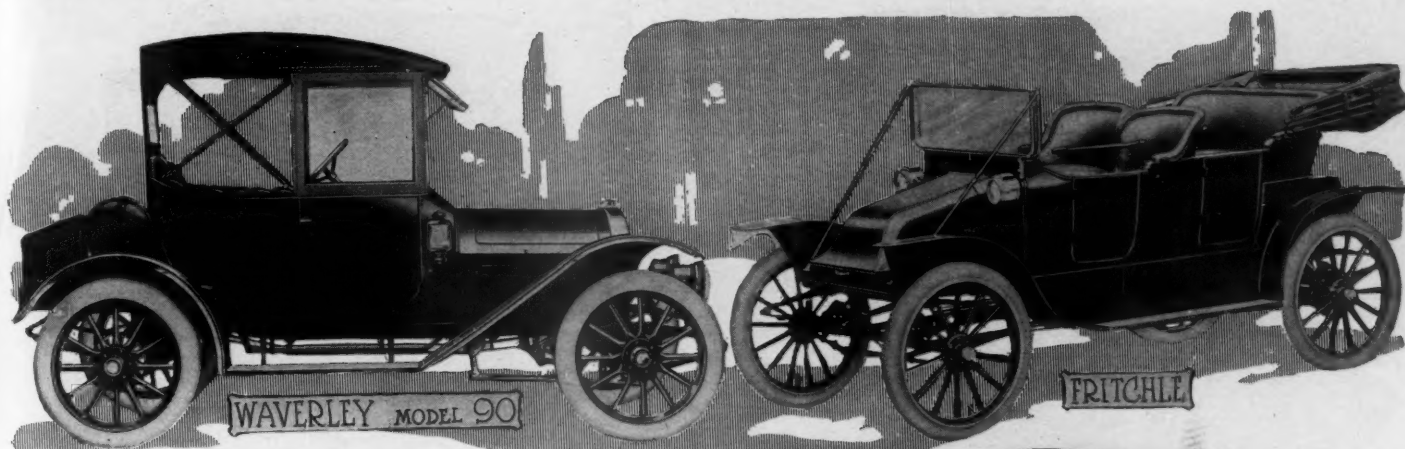
The Grinnell is putting out three models of electric pleasure cars this year, model H, the standard for 1912, model C, which

is built along the same lines as model H, but smaller, and model K, the colonial. All are coupes. Model K is larger all around than the standard. It seats five passengers comfortably and has a 92-inch wheelbase, while that of model H is 90 inches. The front axle is a tubular type and the rear axle floating. The differential is of patented design with floating spider carrying differentiating gears. The motor is a Westinghouse of four-pole series.

HUPP-YEATS

Only 1 year old, the Hupp-Yeats enters the 1912 show circuit with such characteristics as a low-hung body, curved roof, and sloping hood. It carries a Westinghouse motor, Exide Hy-Cap batteries and Goodyear tires. The line consists of four coupes and two runabouts, the latter greatly resembling a gasoline car in appearance. On two of the coupes the wheelbase is 86 inches, on the Patrician coupes 100 inches and 86 on the roadsters. The front axle is of the inverted Lemoine type and the rear a semi-floating. The shafts are easily taken out by removing a nut on the outer ends. The motor is attached directly to the rear axle housing and drives through bevel gears. It is sup-





ported at the front end by a double spring suspension hung from a frame cross channel. The bevel pinion of the motor shaft and bevel driving gear are aligned by screw adjustments. The brakes are internal expanding and operated by foot pedals. The controller is of the Westinghouse type, giving five forward speeds and two reverse. Tiller steer is used.

The coupe body is made of white ash, with poplar framework and having poplar lining boards and aluminum panels. Four passengers are carried, the rear seat being 44½ inches long and 18 inches wide, and the front seat 42½ inches long and 17 inches wide. The height above the seats is 43½ inches and the foot space between the seats 21 inches.

KIMBALL

The Kimball electric is a standard coupe model with the option of shaft, chain or other final drive from the jackshaft to the rear axle. As illustrated, it is fitted with solid tires, 36 by 4-inch sizes being used. The battery, forty-two cells of Exide, is divided, part being carried in front under a short hood and the remainder in a compartment back of the seat. Control is by steering wheel on the left-hand side, the illustration at the start of

this article showing the interior arrangement as well as the usual Kimball finish which is a feature of all the bodies.

OHIO

Little change in mechanical or electrical construction is found in the Ohio, the company standing pat. However, several new models have been added, one of which is a Queen Anne victoria; then there are

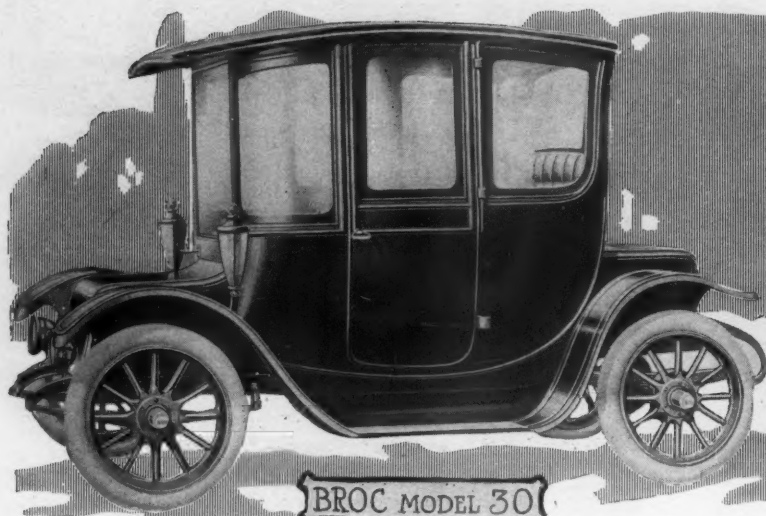


two large five-passenger coupes and in the commercial line, a 1000-pound light delivery. Such features as magnetic control, shaft drive without universal joints, drop frame, low center of gravity, large wheels and tires, single-piece drop forged I-beam front axle and full floating rear, drop windows and piano-hinged hood are retained. This magnetic control differs from the conventional in that instead of a side lever a small disk located on the steering post controls the various speeds. This controller also includes a device for automatically turning off the power when leaving the car standing. The motor suspension is another feature, the motor being bolted rigidly to the torsion tube, making a unit of the motor, torsion tube and rear axle. The propeller shaft is held concentric with the torsion tube by Hess-Bright bearings at each end of the tube. Working parts all are inclosed. The transmission of power is direct from the motor to the propeller shaft by means of silent gears which run in oil and which are inclosed in an aluminum case. The propeller shaft itself is one piece and of large size. There are three different lengths of wheelbase.

RAUCH & LANG

The main changes in the Rauch & Lang for 1912 are the dropped frame and dropped front axle which show on the four new models added to the line. The aim has been to make the new models larger and





BROC MODEL 30



COLUMBUS

lower which has been brought about successfully, the bodies being 4 inches lower than before while there is 5 inches more room inside the body. This is shown in the small extension coupe or demi-brougham which is almost as large as last year's large extension.

A newcomer in this line is a five-passenger colonial coach in which the passengers all face forward, three being on the rear seat while the front seats swing, making it a unit compartment. No change has been made in body construction, a hardwood framework supporting the sheet aluminum panels and steel hoods. In trimmings not only broadcloth and leather have been retained but now there is offered an assortment of Bedford cords and fancy cloths.

A feature of the lighting is a new side lamp which produces the searchlight effect through a suitable bulb and special reflector without the objectionable appearance of the searchlight or its consumption of current.

Mechanically the Rauch & Lang is much the same as last year. The motor is hung from a three-point suspension and includes as a unit the countershaft which it drives through a silent chain. The motor is of the four-pole type, with laminated pole pieces, while the batteries are placed under the hoods, front and rear, and are connected so as to be at all times in series. The flat type of controller is used. The braking system consists of a pair of expanding brakes inclosed in the rear hubs and operated by a foot pedal. The control handle also is fitted with a mechanical brake operating on the motor shaft. Rauch & Lang make both shaft and chain-driven models and the latter carry all the improvements and refinements found in the shaft models as well as offering a wide choice in bodies.

STANDARD

The Standard is one of the new makes which have come on the market during the last year and for it many points of excellence are claimed. A feature is a straight-line shaft drive, with a double reduction

in the rear axle permitting the use of a high-speed motor. Another point is a peculiar frame construction designed to permit of a long wheelbased car turning in a small circle. The power plant is suspended in a trunnion ring, a construction claimed to be original. Other mechanical features are a drop front axle, the steering lever placed above the axle, the tie rod behind the front axle, swiveled steering brackets to prevent binding, divided battery, drop frame, all brakes used in a drum-type continuous torque controller, disconnected controller with charging line so that work can be done on the controller while the car is on charge, and no part of the battery under the seats.

The Standard chassis is of the shaft-driven type and carries thirty cells of eleven-plate Exide battery located in four trays of nine cells each—two trays of six cells each carried in the rear and two trays of nine each carried on the front end of the frame under a forward hood. The motor, which is inclosed, is mounted in a bracket, which is carried on two swivel brackets, which in turn bolt to the sub-frame members, so the motor is free to conform to any movement of the rear

axle and torsion tube. The latter ties it to the rear axle, but it also is anchored thereto by two diagonal strut rods. Because of the motor support, the driving effort of the rear wheels is transmitted through the torsion tube direct to the frame members. The entire motor weight is carried on the frame work of the car rather than the rear axle. The rear axle is a three-quarter floating type, the axle housing being made up of swedged steel tubes, which unite with the differential housing and at their outer ends extend through the brake drums and the wheel hubs. A large ball bearing, directly in line with the wheel spokes, carries the entire load at each end. The controller is of the continuous torque type and gives six speeds forward and three reverse. The electrical contacts are built up on a drum which rotates behind the fingers.

STUDEBAKER

Noticed on the new Studebakers are a larger body, longer wheelbase, thirty-two cells instead of twenty-six, a heavier motor and choice of cushion or pneumatic tires. The model caption has been changed from 17 B to 17 K and in the



BORLAND



way of changes one finds chiefly refinements. There still are three body styles—landaulet, coupe and phaeton, while the wheelbase now is 74 inches instead of 71. The tire sizes, too, have been increased, but only slightly; from 30 by $3\frac{1}{2}$ to 31 by 4. A departure in the addition of Bedford cloth to the upholstery line which also includes cloth and leather. More room is found in the coupes, where the folding seat is capable of accommodating two persons, whereas a year ago only one could sit here. The Studebakers have retained their operating brake on the controller handle which is simply mechanical. The use of shunt speed as a purely emergency provision is assisted and emphasized by the fact that in order to keep the shunt speed in operation, the operator must hold the controller in place. If it is released the controller jumps back to the highest normal speed. To prevent mischievous persons throwing the controller onto a running notch, the Studebaker prevents the key being thrown into a running position until the controller handle is at neutral.

In keeping with the trend of the times, the Studebakers have sought to secure more roominess in the body, which has been accomplished by a refining process.

WAVERLEY

The most startling innovation in the Waverley line for 1912 is the putting out of a five-passenger electric limousine which is remarkable for its body lines which are copied after the town chariot of the first French empire, having a long, sweeping curve from rear to front, ending at the coupe pillar in a sharp backward curve. The roof is curved slightly. The finish is black with gold lines, gold-plated lamps, ivory-white wheels and window frames and an interior upholstered in brocade of Louis XVI design. In the way of lighting, the lamps are cut glass with gold mountings, the interior being illuminated by means of a dome lamp in the center and two bracket lights over the rear seat. This big car has a length over all of 144 inches, a 104-inch wheelbase, while the rear seat is 47 inches wide. Mechanically, there is included shaft drive, no-arc controller, el-

liptic springs and thirty-four cells of thirteen-plate Hy-Cap or Ironclad batteries.

In addition to the limousine, the Waverley line for 1912 includes model 91, a four-passenger brougham which is 9 inches longer than last year's model of similar design; and which has wider and deeper seats and larger window openings and which has a wheelbase of 89 inches. Model 90 is an entirely new car, being a sheltered roadster built along gasoline lines and having a folding semi-landaulet top, long front hood, wheel steer and with trunk and tank in the rear. Three passengers can be carried. The dimensions of this model are: Length over all, 144 inches; wheelbase, 104 inches; interior length, 57 inches; width of seat, 44 inches. Model 96 is a victoria phaeton and model 88 is still another addition to the line.

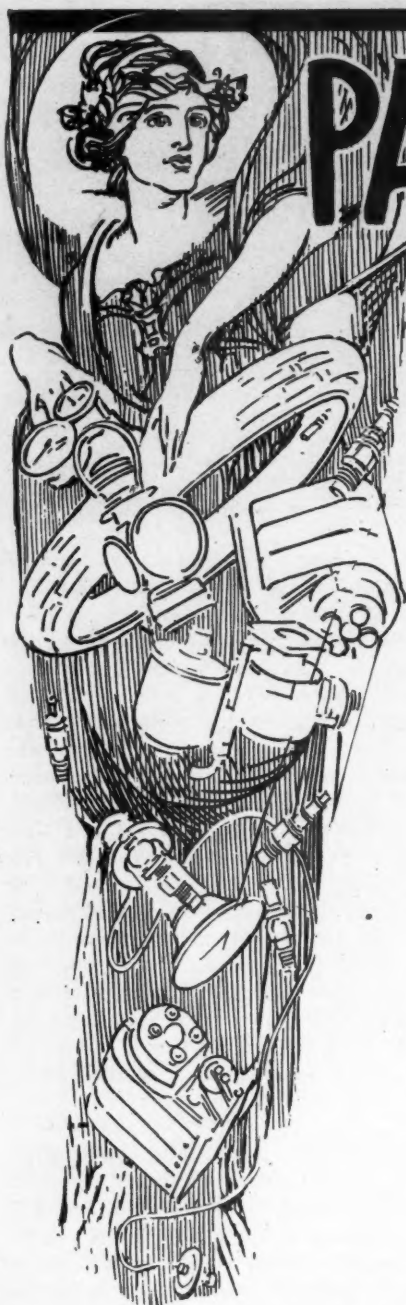
WOODS

Heretofore an advocate of chain drive, the Woods comes out for 1912 with a shaft-drive type which is known as model 1316. The advocacy of the chain was caused by the belief in solid tires and the Woods company points to the fact that in 1905 it showed a shaft-driven car equipped with pneumatic tires at the Chicago show, which it claims was the first shaft-drive electric ever turned out. The company has decided to discontinue its chain-driven models and to make only the shaft-drive.

New features found on this most recent model are the total absence of universal joints in any of the driving shafts; pivot suspension and balance of motor; unit construction of motor and rear axle; control and driving mechanism mounted on the body; all operating parts inclosed by coverings which are easily removed; entire wiring system inclosed in conduit tubes; one-piece rear axle housing and Hess-Bright bearings used throughout.

Outside of these points, dual tread anti-skid solid cushion tires are fitted, 32 inches in front and 34 in the rear. The carrying capacity is five, three on the rear seat and two on the front seat. The wheelbase is 90 inches and the motor that is used is a Woods Special.





PARTS AND ACCESSORIES

Developments in Car Fittings

and give better traction on slippery streets or muddy roads. Nearly every manufacturer of tire casings is bringing out special treads and several of them have produced new forms during the past 12 months. The most unique of these is the chain tread, in which there is molded in the rubber of the tread a double row of chains around the circumference. Another concern has brought out a somewhat similar tread in which the anti-skid feature takes the form of rings which are interconnected by bars. Others appear as diagonal lugs or indentations in the surface of the tire. The vacuum-cup principle is employed to a greater extent this year and the original Bailey tread is as much in evidence as ever. Straight side tires have gained in favor on account of their no-rim-cutting feature, and in the realm of tubes the red tube seems to have gained much popularity.

RIMS

The feature of the rims department for the year is the design of demountable rims for wire wheels. Two different rim makers are showing demountable rims for this type of wheel, an evidence that the prophecy as to the use of this type of wheel in America in place of the wood wheel is in a fair way to be fulfilled. Next in order of importance is the increase in universal rims, that is, rims with which any type may be employed whether clincher or straight-side. Lastly, there is a continuance of the tendency noted for the past 2 or 3 years towards making the rims simpler and quicker to operate and to make all parts permanently attached to the rim.

HORNS

Consideration of the resume of the field of warning signals which appeared in Motor Age January 11 shows that there has been a general refinement of motor horns during the past year, although no radical changes have been wrought. The chief aim of the horn manufacturer seems to have been to increase the convenience of their use by the addition of minor features and by the combination of other types. The bulb horn has been taken into partnership with the electric signal and the development in the latter during the year had been mostly in bringing out combination electric horns with which the bulb feature is incorporated. This is to permit the motorists to comply with city

ordinances against loud electric signals and at the same time provide them with a long-distance signal for country service. This year's elimination of the trouble due to clogging of the air orifice in the exhaust horn probably marks this type of horn as the one which has shown the most development this year.

SPEEDOMETERS

Few radical changes are to be noticed in the speed-indicator field and it would seem as if the makers of these instruments have devoted more energy during the past year towards refinements than alteration of design, the main issue being a steady pointer. The only new design that has appeared is the pneumatic speedometer. There seems to have been more development in the commercial field than in the pleasure field so far as speed indicator devices are concerned, as one maker, at least, has brought out a speedometer with a maximum hand by which the department head can tell when the driver has exceeded the speed limit. Another concern has gone still further and produced an automatic recorder which registers every stop of the truck, the length of time it stops, the length of time running, and the speed at all times.

SHOCK ABSORBERS

There have been several new types of shock-absorbing devices brought out for the 1912 season, two of which are quite radical in design. One of them is of the coil-spring principle, but which is connected between the steering arm and the steering knuckle on the front axle, a somewhat unusual location. Another operates on the dash pot idea in which the resistance to the flow of a liquid through the small holes of the piston is employed to dampen the vibrations of the springs due to road shocks. The standard type of shock absorbers show very slight change. The makers seem to be satisfied with their product so far as design is concerned, but there is noticed some slight alterations in making adjustments from wear somewhat more convenient.

WINDSHIELDS

The feature of windshield development has been the production of the ventilating type of shield by which the bottom of the lower portion of the shield can be displaced inward so as to admit air over the dash for the ventilation of fore-door bodies. The small torpedo shields are

MOTOR car accessories are as important and as truly a part of the industry as the cars themselves, and each year sees a greater increase in their importance. Motor car users are a class that call, above everything else, for convenience, and it is the minor accessories and fittings which may or may not be part of the original equipment of the car that make the car the commercial success that it is. Each year sees more of the so-called accessories fitted as stock equipment of the cars as they come from the factory. Two or 3 years ago a purchaser of a car bought most of his equipment. Now the car maker buys his accessories in wholesale lots, including their cost with the original cost of the car, saving the buyer extra expense.

TIRES

In the field of tires this year the most noticeable development is the new forms of tire treads designed to prevent skidding

OF 1912 SEASON

Trend As Illustrated at Shows

shown in more styles than formerly and practically all of them are arranged to be folded forward or backward as desired. The so-called universal windshield in which either panel or the shield as a whole can be placed at any angle desired has gained in popularity, and automatic locks have entirely displaced hand-operated locks on all but the cheapest designs. Clear-vision shields are by far the most popular type and the methods devised for holding the glass without the middle band show that the last 12 months have seen a great deal of work along this line.

SELF-STARTERS

The shining light so far as development in the accessory field is concerned is the self-starter. There never has been in the history of motoring a feature which has attained such wide popularity and shown such great development in so short a time as self-starting devices for motors have within the past 6 months. Whereas there were two cars which had the self-starting feature a year ago, there are now about sixty-five fitting starters as stock equipment, while the number of special devices applicable to any car have increased from a bare half-dozen to nearly fifty.

LIGHTING

Next to starters probably the greatest development has occurred in electric lighting which has been made possible by the use of metallic filaments and the methods of making them more permanent, and also in the recognition of the fact that it requires a special battery for lighting service. Of course, methods of providing a constant current supply in a generator driven at varying speeds has been the difficulty which has held back development of electricity for illumination of cars, but there are now a number of special automatic controls by which the current is kept constant and also a number of constant-current dynamos in which the regulating features are an inherent part of the generator design. In acetylene lighting the chief features are the methods of turning on the gas and lighting it from the seat.

MAGNETOS

Chief among the developments in the field of magnetos are the methods devised for automatic control of the spark. A number of makers have brought out mechanisms for attachment to their apparatus which advance and retard the

spark automatically as the speed of the motor increases or decreases so the spark control requires no attention from the driver. Several have devised means of increasing sparking efficiency of their product at low speed. There has been a slight advance toward the placing of individual transformer coils near the spark plugs so that the length of high tension wires may be reduced and a wave of general improvement in detail of construction has cleaned out many of the features of the various mechanisms which have been trouble makers in the past. Most of the prominent makes have been rendered thoroughly water and dust-proof.

CARBURETERS

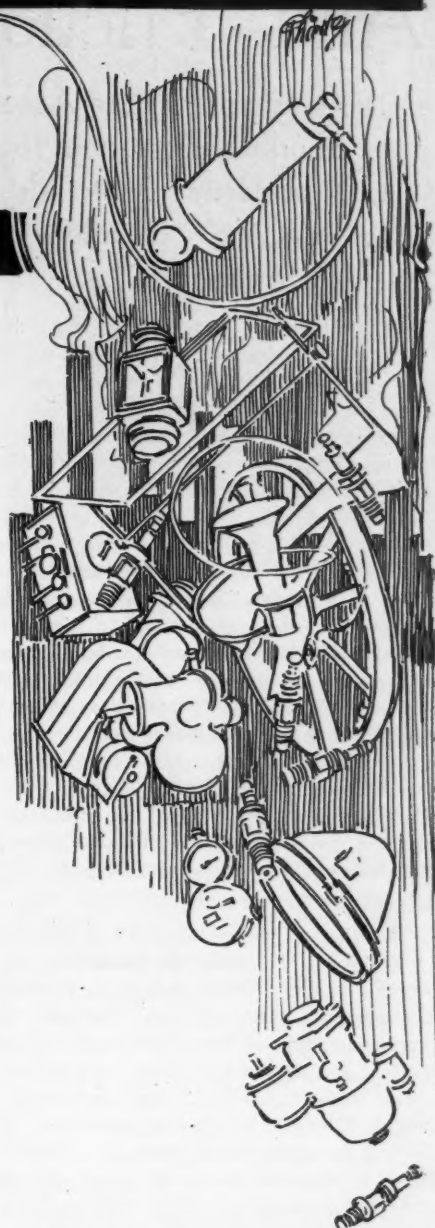
Carbureter manufacturers are working on a number of problems looking toward improvement of the mixture at all speeds and increased accessibility. Three or four of the leading makers now have new types under test, but are not yet ready to announce them. Others have brought out radical changes. In one make the auxiliary valve has been discarded and the mechanical carbureter without springs or other variable factors substituted. Another has altered the principle of the carbureter by employing the auxiliary air current to aid in volatilizing the fuel. The float idea has been entirely discontinued in one instance and in others steel needle valves have been substituted for bronze. The diameter of the gasoline passage to the float chamber has been increased in some types.

BEARINGS

The features of anti-friction bearing situation for the coming season are a general refinement of workmanship, improvement in the grades of steel employed and in the methods of hardening and treating them; the adoption of lighter and more efficient steel separators; and the introduction of annular ball bearings which are self-aligning.

LAMPS

In the field of lamps for motor cars there are two or three tendencies to be noted for the new year. The most universal of these is the adoption by nearly all makers of the Ediswan sockets. The makers are getting away from the brass finish as practically all of them are offering black enamel or nickel finish as an option and others are offering these two



finishes as stock in some styles. The gun metal finish which was so popular a short time ago is not featured to a great extent. The colonial type of inclosed bodies has resulted in the appearance of many colonial designs in pillar lamps. A disappearing corner light for limousines which operates on the same principle as the berth light in Pullman cars, is featured by one of the makers and there may also be seen a combination of ventilator and side lamp arranged to be set into the dash.

TIRE ACCESSORIES

An active department of the accessory field are the tire vulcanizers and in these the individual owner seems to be favored, although there are special designs for garages and repair shops in which several tires can be worked upon at the same time. Inner sleeve and tire protectors of all sorts as well as anti-skid chains are to be seen in profusion, and while there are no radical changes in designs, better materials and construction seem to be the rule. Engine-driven pumps are the feature of tire inflators for the year.

Anti-Friction Bearings—Styles and Uses

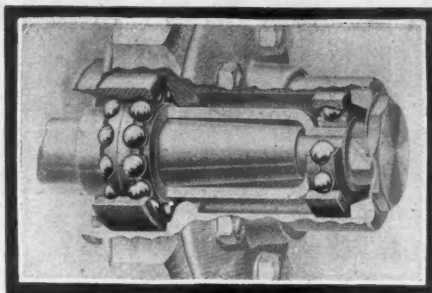
Better Designing, More Accurate Workmanship, and the Use of Better Materials Are Chief Developments in This Line

I NASMUCH as accuracy of workmanship, careful designing, and the use of the best materials are absolutely necessary to produce a successful anti-friction bearing, progress in this direction has been one of the most important developments in the way of ball and roller bearing construction during the past year. The features of the anti-friction bearing situation for the coming season, therefore, are: a general refinement in workmanship, improvement in the grades of steels employed and in the methods of hardening and treating; the adoption of lighter, simpler and more efficient steel separators; and the introduction of self-aligning annular ball bearings.

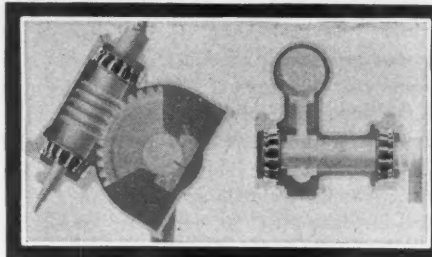
For the benefit of those not familiar with the different types and styles of anti-friction bearings, a few words of explanation might serve to make the following descriptions more interesting and intelligible.

Minimizing Friction

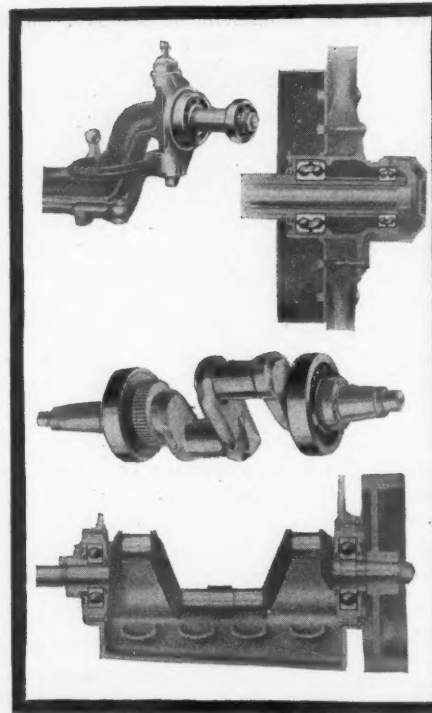
The aim of modern engineering practice in designing, building and operating machinery of every description is to minimize friction in all rotating parts, thereby conserving energy and securing economy of operation and low maintenance cost. Engineers engaged in motor car construction realized that conservation of power was absolutely necessary in all parts of the mechanism if the size of the engine and expense of operation were to be kept within reasonable bounds. Plain bearings, therefore, have been abandoned at all points practicable, because of the serious friction losses and rapid wear, and ball or roller bearings substituted in their place. The durability, ease of installation and maintenance, and the very high efficiency of ball and roller bearings, commend them to all engineers who endeavor to keep up with the spirit of progress and refinement of design that is



ANNULAR-BALL BEARING REAR WHEEL



ROLLERS IN STEERING GEAR



USE OF ANNULAR BALL-BEARINGS

There Is a Marked Tendency Toward the Adoption of Lighter, Simpler and More Efficient Separators and Self-Aligning Bearings

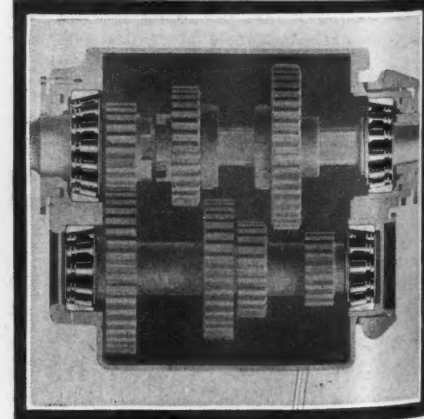
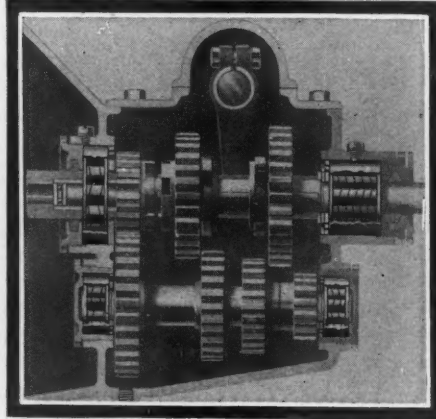
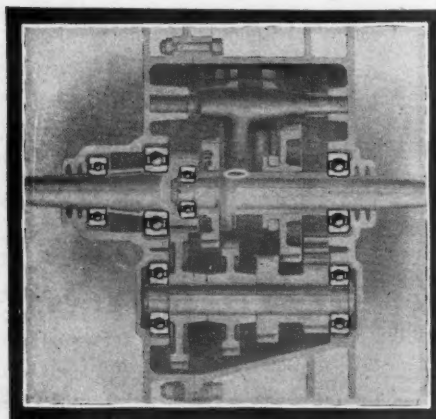
so much in evidence during the present period of mechanical development.

Ball and roller bearings are the two classes into which anti-friction bearings are divided. These classes may each be subdivided into three styles according to the general application of the load for which they are designed. The three styles are: Radial or annular bearings for radial load; axial or thrust bearings for axial load; diagonal or combination radial and axial bearings for load in a diagonal direction.

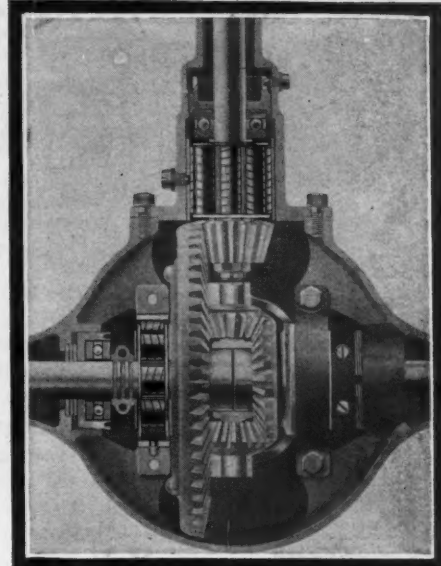
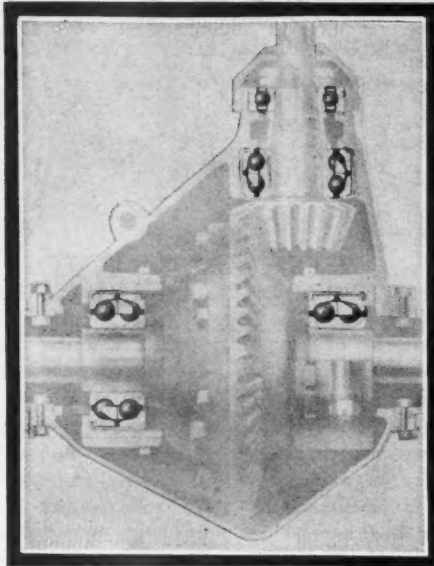
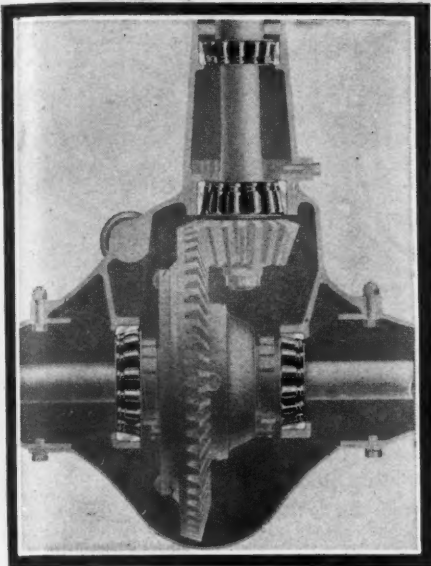
Anti-Friction Bearings Classified

In ball bearings all three kinds consist of two hardened steel rings between which the steel balls revolve on their own axis in or on ground and polished raceways. Likewise in roller bearing construction, the bearing comprises two hardened steel rings or sleeves between which the rollers revolve, but there are many instances in which the roller races are simply interposed directly between the shaft and the journal box without the use of the sleeves. The advantages claimed for the roller bearing is that having a line contact, it is capable of withstanding greater strains or loads than ball bearings, and therefore is less easily damaged than the ball-bearing. On the other hand, however, when properly made and installed, a greater efficiency is claimed for the ball bearing.

Since in a ball bearing the load is borne, not on a liberal surface, but by a few points whose area is due solely to microscopic flattening of the balls and races themselves, and since the loads at these points are not cushioned by an oil film, as in plain bearings, but are carried with direct metal to metal contact, it is obvious that the materials used must be of extraordinary toughness and hardness; and since from their very hardness the balls and races are virtually incompressible, it follows that errors



SHOWING HOW ANNULAR BALL AND ROLLER BEARINGS ARE USED IN TRANSMISSION GEARSETS



INSTALLATIONS OF ROLLER AND BALL BEARINGS IN REAR AXLE MECHANISM

or inaccuracy in the construction or alignment of the ball bearing, and roller bearing, too, for that matter, is most apt to cause their early destruction.

Ball Bearings Highly Efficient

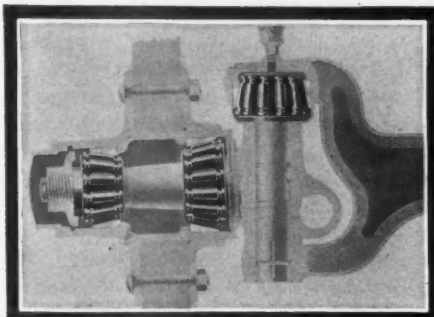
Early ball bearings wore out rapidly, for several reasons. Among these reasons was inaccuracy of form, which resulted in the load being supported by only one ball at a time. Another reason, which could not be overcome with the steels then in use, was the insufficient hardness of both balls and races. Still another was the failure to exclude dirt, which entered and acted as an abrasive to destroy rapidly both ball and races. A fourth reason was that the cup and cone designs first employed did not give the balls a true rolling motion; there was always a spinning, and therefore rubbing movement in addition. The familiar cup and cone bearings of bicycles and other light machinery have been successful only because of the very light loads employed. In the best ball bearings of to-day, however, all these difficulties have been eliminated, the efficiency of the ball bearing is undisputed, and it is invading all classes of machinery.

Ball bearings in which practically the entire space between the inner and outer rings is filled with balls, are known as the

are known as the silent type, because of their more silent operation, there being no clicking sound in the latter when in operation, as is common of the all-ball types. Ball bearings with the full row of balls carry greater loads, but have less efficiency on account of the friction between the steel balls. For this reason it is advantageous to use a separator between the balls, especially for higher speeds, and this is done in many cases.

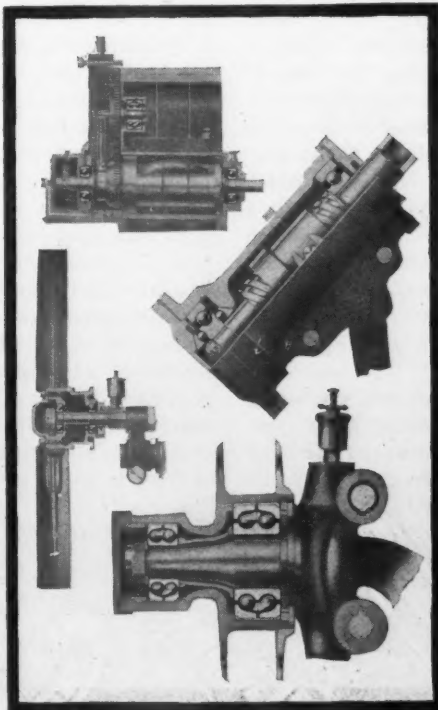
Self-Aligning Bearings

Ball and roller bearings should be placed on shafts in perfect, true alignment, in order that every ball and roller may carry its own proportion of the total load or pressure at all times. If this is not done, there will be times when one ball or roller will have to carry the load of the idle balls or rollers, thus overtaxing its capacity, causing grooves to be cut in the raceways, spools or casings, or breakage of the balls and ultimate destruction of the bearing. To avoid this there are two makes of ball bearings now on the market which are self-aligning. The principle upon which these bearings are designed is very clearly shown in the illustrations which accompany this article on bearings.

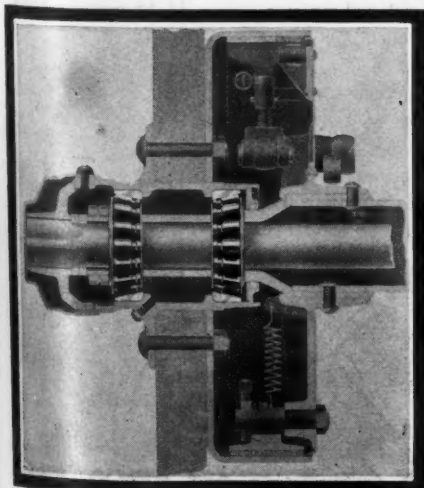


ROLLER BEARINGS IN FRONT AXLE

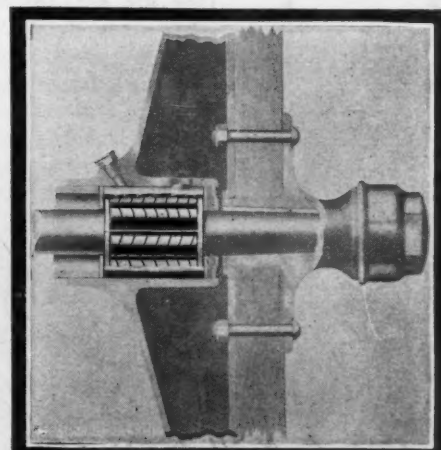
all-ball, or full-ball type, while the bearings in which a cage or separator is employed



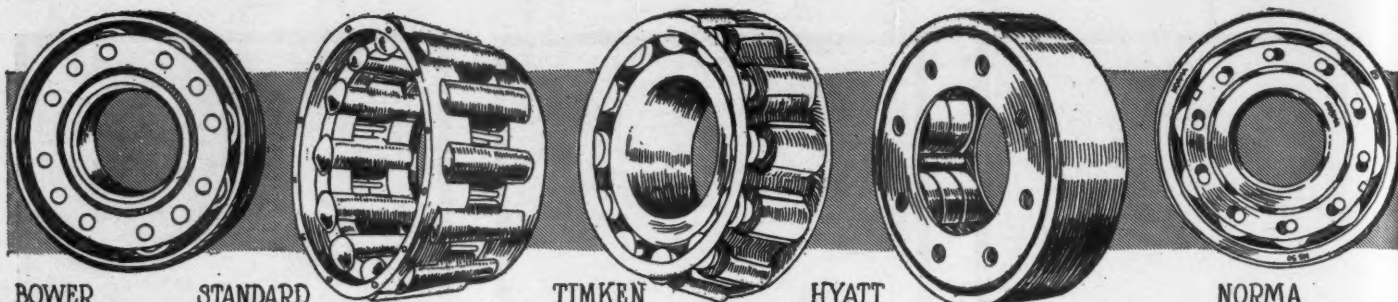
MORE ANNULAR BALL BEARING USES



ROLLER BEARING REAR WHEEL



ROLLER BEARING REAR WHEEL



BOWER

STANDARD

TIMKEN

HYATT

NORMA

SIDE AND SECTIONAL VIEWS OF DIFFERENT TYPES OF ROLLER BEARINGS

Herewith is a brief description of some of the makes at present on the market:

Timken—Though there has been no change in the design and construction of Timken roller bearings, refinement in manufacture and the possibility of working to closer limits, is claimed to have been obtained by the use of most modern machinery. Machinery now is employed for the purpose of sorting the rolls, which eliminates the less reliable system of sorting by hand; and other little improvements of this nature have been developed that add to the general efficiency of the product. Several new sizes also have been added to the line adaptable for use in commercial vehicles of large capacity.

There is but one type of Timken taper roller bearings. This construction combines the advantages of a bearing having true rolling contact between the load carrying elements, together with means of adjustment, and the capacity to carry end loads in practically the same amounts as radial load. The special features of the ribbed cone and the one-piece cage insures the correct alignment of the rolls, which is one of the essential points in the successful operation of a roller bearing.

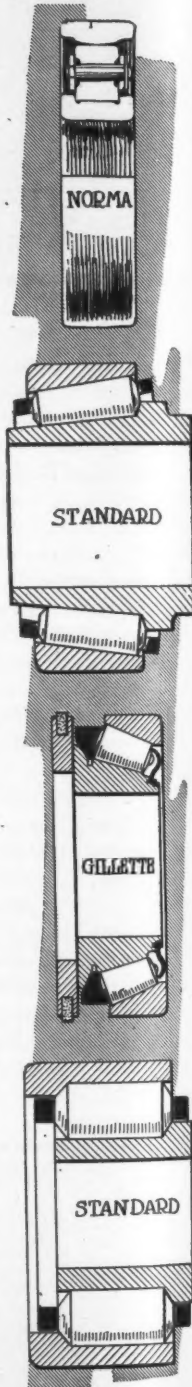
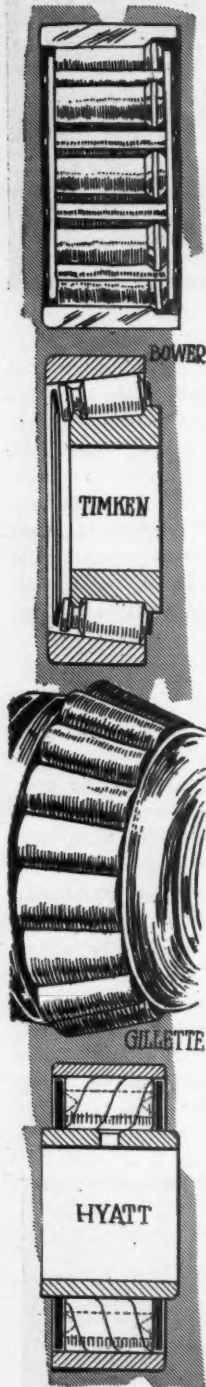
Hyatt—A full and complete line of high-duty roller bearings is a feature of the Hyatt line. In these bearings three times the carrying capacity of the ordinary bearing of the same size is claimed. This increase in efficiency is obtained by substituting nickel steel for carbon stock in the rollers, and the use of hardened and ground inner sleeves and outer linings. These bearings have a lining of special steel, which eliminates the necessity of depending upon the quality of the shaft to which they are applied; this feature alone insures a considerable increase in efficiency. The spiral steel, hardened and ground rollers, which are characteristic of Hyatt design, are still retained.

Hyatt high-duty bearings usually are very much shorter than the standard design and, due both to the proportions and the high

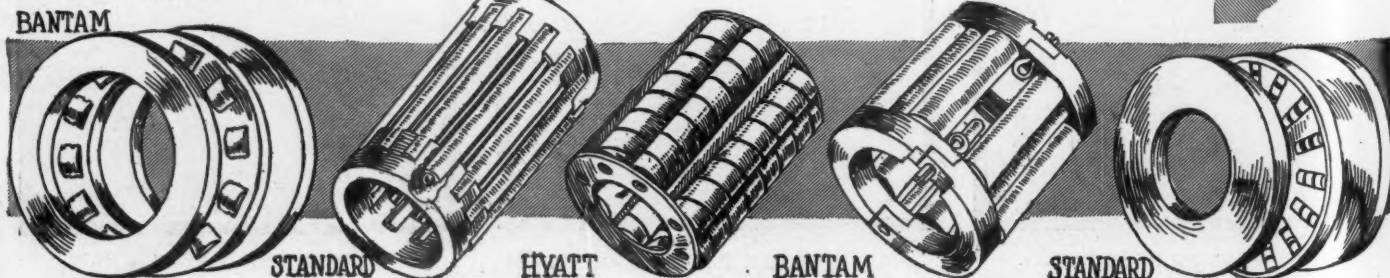
speed for which they are designed, several features of construction are varied from the standard type. The cage has a round bar between every pair of rolls, lending greater strength to its construction and assisting the shorter roll to better maintain its alignment. The rolls themselves are close wound, though ample space is still left to assist lubrication. The inner and outer races for this type are both tubular or solid.

Bower—Having secured a number of additional patents covering its type of roller bearings, the Bower Roller Bearing Co. now offers a complete line of bearings suitable for almost any conceivable service. Bower roller bearings are made in all standard sizes so as to be interchangeable with all prominent makes of either ball or roller bearings, and the company's engineering department is prepared to furnish bearings of special nature if sufficient time is given in which to make the necessary changes for such special work. The principle of the Bower roller bearing is to provide an anti-friction bearing, which combines both radial and end thrust in a single bearing unit, without combining radial and end thrust on a single element, thereby conserving its carrying capacity. The body of the roll carries the radial load and is not affected by end thrust, while a single end of the roll is so designed as to carry the end thrust load independently of the radial load.

Standard—The Standard Roller Bearing Co. has brought out nothing new for the present season, but its tapered roller bearings now are interchangeable with any size of Timken bearings, and the company's light-series roller bearings are interchangeable with standard-sized radial ball bearings. Standard ball and roller bearings are made in several different designs so as to be adaptable to any use. The line includes: Straight journal roller bearings, separate, with inner or outer linings, or both; all of which are of steel hardened and ground; also roller bearings for motors; adjustable taper roller bearings; plain roller thrust bearings; ball thrust bearings with bronze



BANTAM



STANDARD

HYATT

BANTAM

STANDARD



SCHAFFER

STANDARD

HESS-BRIGHT

NEW
DEPARTURE

Rand S

VARIOUS MAKES OF ANNULAR BALL BEARING NOW IN USE

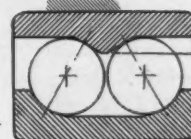
ball cages and steel washers, and of different designs and constructions for horizontal and vertical loads, and with leveling or radius washers; grooved ball end thrust bearings; steel, brass and bronze balls of different grades; and either full-type annular ball bearings, or the silent type with a cage or spacer consisting of two rings riveted together, which have recesses in them of the same general shape and radius of the balls.

Hess-Bright—There is practically no change in the design of Hess-Bright annular ball bearings, except that the company is putting out a bearing with a pressed steel separator having a reinforced web, which is especially adapted for high speed work. The standard design of cast bronze separator for medium and high speeds, however, is still used; and a brass separator is employed for low speed work. The Hess-Bright Mfg. Co., manufacturer and importer of HB-DWF ball bearings, specializes in the production of annular ball bearings for radial and thrust loads. The radial bearings are made in heavy, medium and light series for the same shaft size; there is a special small and magneto series; and the thrust bearings are made for one-direction and two-direction end-thrust loads; the one-direction type having but a single race of balls, and the two-direction having a double race of balls with a heavy steel washer separating the two races.

New Departure—The New Departure Mfg. Co. devotes the entire efforts of one of the largest and most up-to-date plants of its kind to the sole manufacture of a complete line of double-row, single-row and radax type ball-bearings. The Radax type of bearing is a new design brought out for the season of 1912. It is a combination radial and one-direction thrust bearing; and consists of a cone with generated raceway, a cup conforming to the same and concentric with it, and a separator in which the balls are confined. The New Departure single-row or radial ball bearing is an annular type designed for purely radial loads.

It is provided either with a bronze separator formed in two pieces and riveted together after the balls are inserted in the race, or with a steel separator similarly assembled which is brought out for the first time by the company this year. The New Departure double-row ball bearing successfully resists radial and thrust stresses from any direction without appreciable friction and with equal efficiency. It consists of an inner collar with two annular grooves or races, two separate cup rings, a separator in two halves, steel balls and a shell that completes the unit. The company is making a specialty of large double-row bearings for trucks; and a general increase in the efficiency of the product is obtained by means of new advanced methods of workmanship.

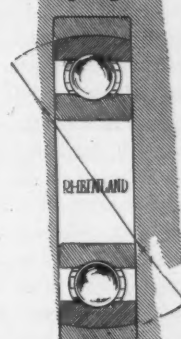
Schafer—Except for a slight change in the style of the separator rings, which consists in the provision of slight recesses opposite each ball, the Schafer ball bearings for which Barthel, Daly & Miller are the sole importers, remain unchanged. Schafer ball bearings are made in styles and sizes adapted to all kinds of ball-bearing service; the line includes normal annular bearings with and without an adjuster for the shaft; double-row annular bearings; magneto bearings for low radial and thrust loads; combination bearings for radial and axial loads; plate thrust bearings; plate thrust bearings for low loads; thrust bearings in which both plates have raceways; thrust bearings with bevelled seat; double thrust bearings held from inside or outside and in which all plates have raceways, and with flat or bevelled seats; double thrust bearings with a housing, one bearing or row of balls for use in both directions, etc. Schafer ball bearings are fitted in two different kinds of ball cages—the U cage, which consists of two U-shaped pressed sheet metal rings that are riveted together to complete the assembly, and the standard cage, which separates the balls by means of concavely pressed separator pieces which are riveted to sheet rings on each end. The construction of this latter cage allows the use of the



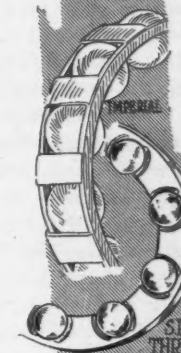
HESS-BRIGHT



Rand S



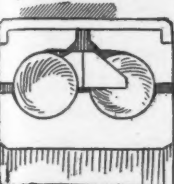
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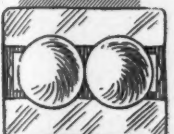
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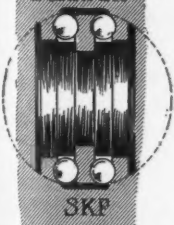
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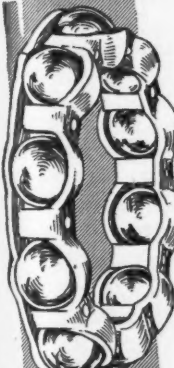
NEW DEPARTURE



SCHAFFER



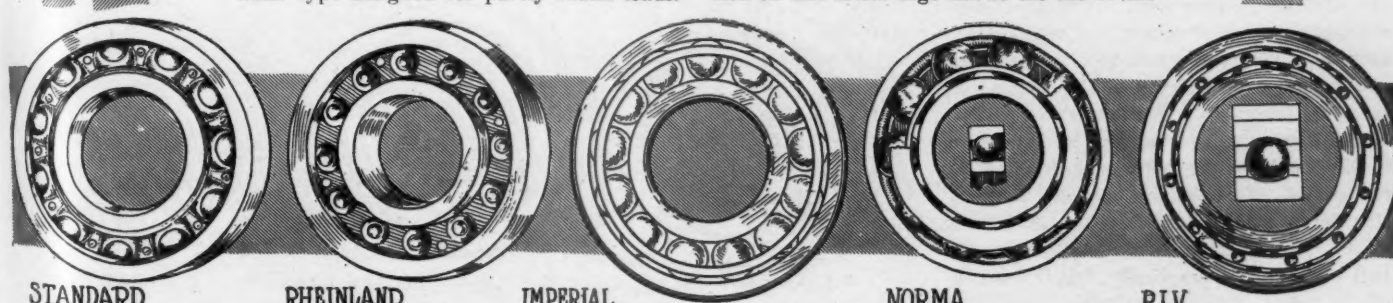
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NEW DEPARTURE



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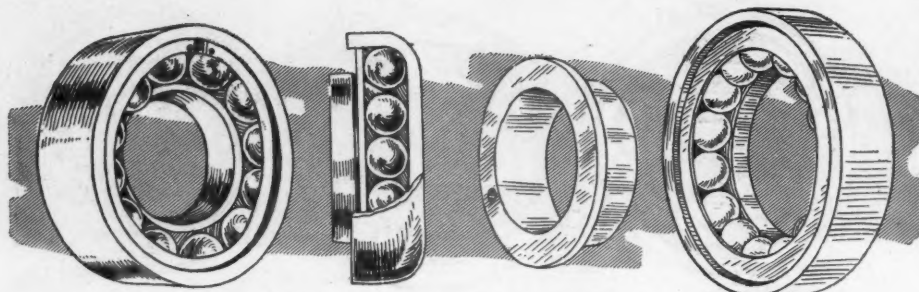
STANDARD

RHEINLAND

IMPERIAL

NORMA

RIV



ADJUSTABLE CUP AND CONE BEARINGS STILL USED IN SOME CARS

greatest possible number of balls; the space between each ball is exceptionally small.

R. I. V.—R. I. V. bearings remain unchanged for 1912. In addition to a full line of radial and ball thrust bearings, the R. I. V. company manufactures a number of styles for various purposes. These include a special annular thrust combination; a special annular type for work of a nature heretofore performed by the old cup and cone type; a self-aligning annular bearing, self-contained; an adapter ball bearing for machinery, shafting and factory uses; and a self-aligning thrust type with seat and bearing self-contained.

D F K—The Bantam Anti-Friction Co.'s D F K bearing is an improved type for motor cars, whose improvement lies in the employment of modern methods of hardening and treating the steels employed, the more advanced means of fitting, and the adoption of a skeleton type of retainer which is lighter and offers less friction. The Bantam ball and roller bearings are made in many types and sizes. The line includes radial ball bearings of the full ball or silent type, adjustable combination radial and thrust designs, thrust bearings of the full ball and silent type; several styles of roller bearings with and without inner and outer sleeves; roller thrust bearings, and cups and cones. A hinged plain roller bearing is one of the features of the line.

S. B. R.—The S. B. R. Specialty Co. makes special types of thrust bearings to order such as are used in steering gears, etc. In these bearings the balls are contained in a brass or bronze ring in a conventional manner, but in one style the balls may protrude from the inside as well as from the two side faces of the ring.

S K F—Self-aligning double row annular and thrust ball-bearings are a feature of the S K F Ball Bearing Co.'s output; and in addition to the phosphor bronze retainer employed, the company now introduces a pressed steel and a pressed brass retainer. By adopting the new pressed steel retainer the balls no longer protrude beyond the sides of the race rings. The chief characteristic of S K F design is that it is self-aligning. The outer ball race is machined and ground to a radius struck from the center of the bearing. The inner race is provided with two grooves, each having a radius slightly larger than the radius of the balls. The balls are retained in position by a single piece retainer, without rivets or screws, which floats between the ball races and is practically frictionless, its

duty being simply to retain the balls in correct relation to one another.

Imperial—The feature of the Imperial radial ball bearing is the design of its pressed steel retainer or cage, which permits of the use of a full set of balls except one. It is unusually light and simple in design and construction, and is flexible, promotes silence and serves its purpose with perhaps the least amount of friction possible. It is a two-piece structure which is assembled without rivets, bolts or screws that might break off and damage the bearing. Except for this feature the Imperial is of conventional design. This is the Imperial's first year on the market and the company's slogan is "American manufacture, German steel, English balls, silent cage, accurate workmanship." The bearing is made in but one style.

S. R. O.—The S. R. O. is a Swiss ball bearing of the radial type, imported by Theo. H. Marburg. It is of conventional design, and one of the advantages claimed for it is that it is made of the finest quality of steel procurable, which is subjected to a special process by which an exceptional degree of hardness, strength and toughness is obtained. The balls are separated by a cage, which consists of two similar rings of compressed steel, securely rivetted together by means of brass rivets. The rings are of L section and when rivetted together form a strong T section, with room for a comparatively generous number of balls.

Rheinland—Rheinland ball bearings are made in several styles and many sizes. The radial ball bearings are furnished with or without a ball-cage, according to their use, and are of conventional design except that a new flexible pressed steel separator is used in place of a built-up cast-steel design. The new separator is very light and simple and permits of the use of nearly a full set of balls. In addition to this there has been added to the line a self-aligning radial bearing and a double-thrust bearing. The Rheinland bearings have been on the market for two years, and other

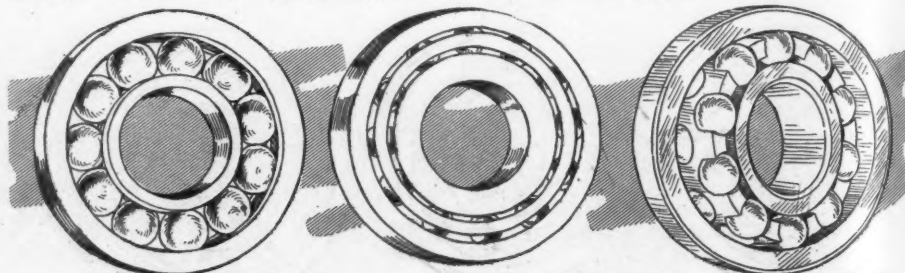
features of their line include magneto bearings providing for both thrust and radial loads, double-acting thrust bearings and other bearings of various designs.

Norma—Norma ball and roller bearings are manufactured in Germany and marketed in this country by the Norma Co. of America. Norma ball bearings are open type, patented ball bearings, but differ from the usual types in that the outer race is open on one side so that the bearing can be taken apart, and all parts can be mounted independently of each other and are interchangeable, thus greatly facilitating and economizing the fitting and assembling of the bearings. A patented ball cage yieldingly grips and guides the balls at their axis of rotation and holds them free from contact with the apertures in the cage.

Norma roller bearings have the dimensions of ball bearings, but are capable of receiving much higher load than ball bearings of the same dimensions at the same speed, and can be applied with advantages in places where ball bearings are not equal to the strain. Norma roller bearings also are of the open type. The outer race is open-sided, and the bearing can be taken apart and its races conveniently and separately fitted and mounted. It has short, cylindrical rollers held and guided in a steel cage secured against skewing and exerting no axial pressure on their side guides. The outer race has a convex, or slightly ball-shaped interior roller track. The inner race is cylindrical, and both races when in application are rigidly fastened.

Gillette—Simplicity is the feature of the Gillette motor car roller bearing, which is made by the R. G. Peters Mfg. Co., as no roller cage is used. A continuous row of rollers is constrained to roll between the cone and the cup, so that any end thrust of the rollers is carried by a thrust ring which bears against the back flange of the cone. A retaining ring is provided to hold the rollers in position when the cup is removed, and there is a snap ring to lock the retaining ring in place. To disassemble and clean the bearings it is only necessary to remove the snap ring in order to release the retaining ring and remove the rollers. The assembled bearing is shown in the accompanying illustration.

Sparks-Withington—In addition to an extensive line of steel stampings, the Sparks-Withington makes cups and cones for adjustable ball bearings. The company is specializing this year in the production of large size bearings for trucks.



A FULL-BALL TYPE

S K F SELF-ALIGNING BEARING

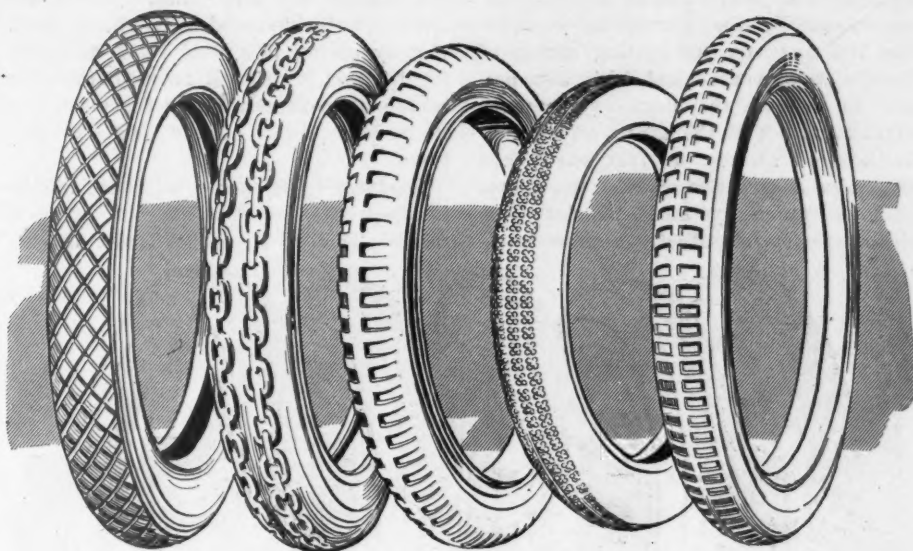
A SILENT TYPE

Non-Skid Treads Feature of 1912 Tires

New Types of Anti-Skid Tires Are Unique. Designs Include Chain, V-Shaped, Zig-Zag, Cross-Bar, Daisy, Arrow-Head Diamond, and Double - Cross Shapes

THERE are several features to be noted in the field of motor car tires for the coming year in which there is shown a decided development. The chief of these is in the matter of anti-skid devices. The number of accidents with injury to passengers and damage to cars which has occurred on account of skidding on slippery pavements or muddy streets has shown the need for some method of preventing slipping of the wheels. The original method of overcoming the difficulty was by the use of tire chains, which, so far as the prevention of skidding and the improvement of traction is concerned, fulfill their purpose admirably. But there are two points urged against them. One of these is that the use of chains is detrimental to the tire in that the wear on the tire treads is excessive when chains are introduced between them and the road surface. This is particularly true if, as is often the case, the chains are not properly applied. A second objection to tire chains is that there is a certain amount of inconvenience and labor required in applying them, particularly when the usual custom is followed of not putting them on until it becomes absolutely necessary, the latter usually occurring in a muddy road or greasy street.

The logical method then would seem to be to incorporate the skidding prevention



Ajax
Diamond

U. S.
Chain

Seamless
Cross-Bar

Portage
Daisy

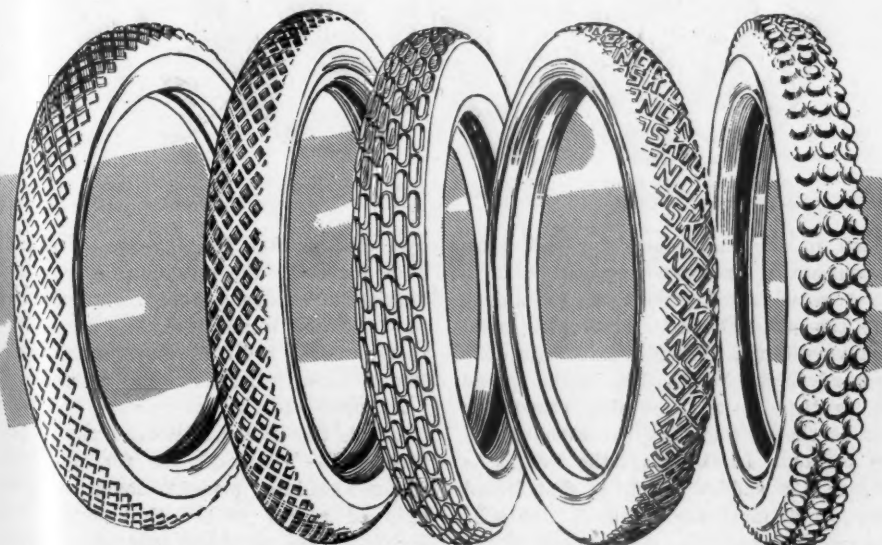
Stein
Tractor

feature with the tire itself; in other words, a non-skid tread. Tires with treads of this kind have been on the market for many years with gradually increasing popularity. But this year marks a great addition to the number of non-skid treads which, it is probable, is merely an answer to the demands of the users during the past year. Anti-skid treads may be divided into two major classes; first, those in which the tread or wearing surface of the tire itself is roughened by the employment of corrugations in the tread or of rubber projections upon the tread which are in reality an integral portion of the material composing the tire. The second type of non-skid tread is that in which there is embedded in it metal pins or knobs or plates which will provide not only a wearing surface of greater durability than the rubber, but will also afford a gripping surface on the tire. These

metal insertions usually take the form of steel studs or rivets, which have their base in the fabric layer of the tire and project through the outer tread. The steel grip tires are an example of this type. As to the shape and size of the irregularities in the tread surface of tires of the first class there is a very wide diversity, ranging from the small round buttons of the Bailey tread and the small circumferential lines of the Michelin to the heavy chain corrugations of the United States and the staggard tread of the Republic or the cross bar effect of the new Diamond. No matter what the shape, these are all designed to do two things, first to present a series of surfaces which will obstruct slipping of the tire sidewise and to present other surfaces which will increase traction. In addition to this there is also the class of tires in which there is expected to be a certain gripping effect, due to the vacuum formed between the sides of an air chamber in the tire and the road surface, as in the vacuum cup tire of the Pennsylvania and to a certain extent in the interstices in the letters of the Firestone tread.

It is estimated that about two-fifths of the total output of tire manufacturers is non-skid treads. These cost in the neighborhood of 20 per cent more than the ordinary plain tread of the same size. In spite of the increased cost there is an economy in the purchase of non-skid tires, as in practically every instance the anti-skid feature means added stock to the tires, so that when the extra stock is worn down to where the special feature is lost there is left practically as much wearing surface as in a new tire of the plain-tread type. This is in addition to the safety and better tractive qualities given.

Another feature of 1912 tires is the



Diamond
Diamond

Swinehart
Criss-Cross

Republic
Staggard

Firestone
Lettered

Federal
Rugged

increase of the use of the straight-side tire on account of its freedom from rim cutting. With the old-style clincher with its inward curving rim, to run on the flattened tire meant almost certain damage to it. By the use of the straight-side tire and rim the cutting action of the rim is prevented and it is also possible to increase the stock at the point of contact, so that the effects of flat running are less serious. In fact, one of the companies making this class of tire claims to have run many miles on flat tires without perceptible effect. A third devel-

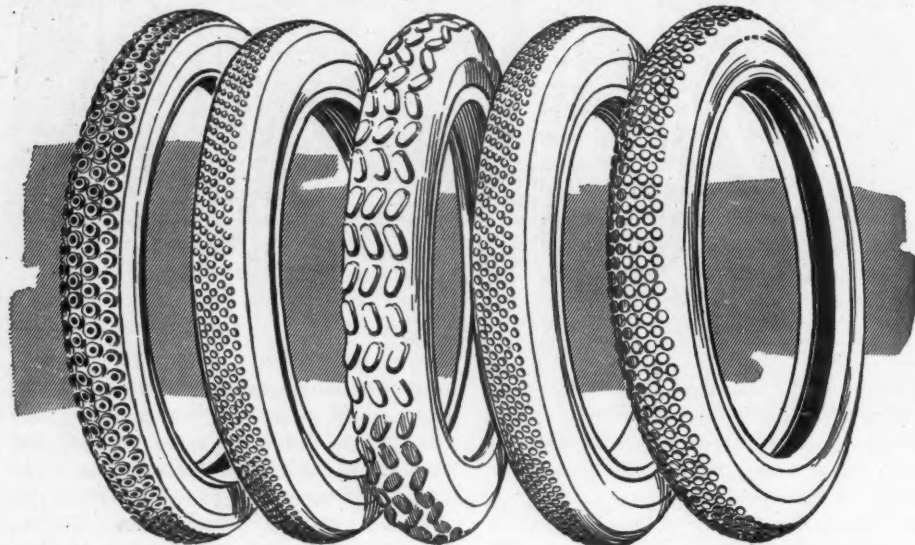
opment for the year is in the increase in the use of oversized tires, and practically all the manufacturers this year are supplying tires of extra size to fit standard size rims. For instance, the oversized tire corresponding to a standard 34 by 4-inch tire is 35 by 4½ inches. It costs about 30 per cent more than regular size, but the tires give much longer service and better riding qualities. Another feature in tires for this season is in the number of lines of inner tubes of red gum. Whether or not a red tube is more substantial and of longer life than the usual gray tube is a matter of dispute, but there is a popular impression that such is the case, and it is probable that it is due to this impression rather than to the innate quality of the tube that tires of this color are being marketed.

Electric tire, while not an entirely new invention, is shown this year for the first time. It is a development of the Firestone special electric which has been on the market for some time. The newer tire has been improved in its riding qualities by giving it a dual tread and adding internal cavities at frequent intervals in the base directly under the tread and is made in both smooth and anti-skid types.

Goodyear—The latest addition to the Goodyear line of tires is the non-skid tread. This is 1 year old and is con-

Another of the features of Goodyear tires, whether of the non-skid type or smooth, is the no-rim-cut clincher. This is obtained by means of a straight side to the tire. There are no hooks on the base of the tire as in the clincher type, but vulcanized into each side of the base are three flat bands consisting of 126 braided piano wires. These wires make the tire base unstretchable, so that it cannot loosen up enough to come off over the rim flange. Where the rim flanges curve outward the no-rim-cut tire has an extra flare. This enables the tire to be made 10 per cent oversize without misfit to the rim. In addition to the line of inner tubes and tire repair supplies this company makes a special pneumatic tire for electric vehicles designed to give the high efficiency required for electrically-propelled cars.

United States—There are several novelties in connection with the United States Tire Co.'s line for this year. In the first place, tires are exhibited bearing the brand United States tires, which in itself is an innovation. Heretofore the products of this company's factories have been labeled either Hartford, G & J, Morgan & Wright or Continental. The most conspicuous feature of these tires is the new chain tread. This is a non-skid tire in which the raised portion is in the form of a double row of chain links around the circumference of the tire. Another anti-skid, the nobby tread, which has been

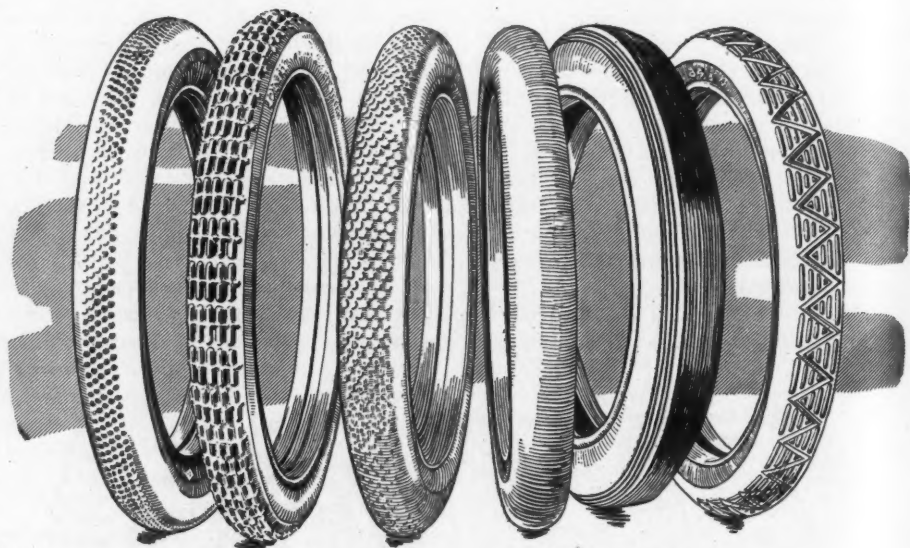


Pennsylvania Vacuum-Cup Michelin Steel-Grip U. S. Nobby U. S. Steel-Grip Kelly-Springfield Bailey

Firestone—Among the tire casings designed particularly for non-skid features is the Firestone tire. This is unique in that the raised portions of the tread consist of lettering which spells out the word Non-Skid. The lettering presents countless sharp edges to the road and the hollows of the letters tend to create a vacuum against the paving, combining the two principles of skid prevention. This tire, as are all other Firestones, with the exception of the regular clincher pattern, is furnished with a floating flap. The line of pneumatic tires includes the quick-detachable clincher, straight-side and regular clincher. The Firestone cushion elec-

trical tire, while not an entirely new invention, is shown this year for the first time. It is a development of the Firestone special electric which has been on the market for some time. The newer tire has been improved in its riding qualities by giving it a dual tread and adding internal cavities at frequent intervals in the base directly under the tread and is made in both smooth and anti-skid types.

continued in the same form for this year. It consists of an extra tread as thick as the regular tread, which is vulcanized onto the standard tire. This extra tread is of very tough rubber and cut into deep diamond-shaped blocks. The blocks spread out as they near the casing proper, so that at the bottom they cover the entire tire surface. In this way, the weight as well as the sudden shock is distributed over just as much surface as it would be in a smooth-tread tire. This is one of the features of this make of non-skid tire.



Diamond Steel Grip Diamond Safety Fisk Bailey Diamond Smooth Michelin Ridge Lee Zig-Zag

upon the market for 3 years, is also in evidence as is the steel stud tire, which consists of hardened steel rivets embedded in the outer tread. In addition to this there are the ordinary plain tread and a line of inner tubes and tire accessories.

Diamond—Distinctive among non-skid treads is the new safety-tread tire, a feature of the Diamond line for this year. The non-skidding principle consists of cross bars of raised rubber that extend the width of the tire and are so arranged that when brakes are applied on a slip-

pery pavement the forward bar on the tread cuts through the film of grease or water and tends to leave the pavement dry behind it. The crossbars that follow thus come in contact with the dry surface to stop the forward skid of the car. Other bars that run lengthwise of the tread act in the same way when a skid slip occurs. The Diamond grip tire, steel studded, is offered for winter work in addition to the Bailey tread and the ordinary round or plain tread. The latest addition to the Diamond line is the Silvertown tire. The chief feature of this is that instead of the usual fabric in the tire there is used strands of cord woven in the pure gum, the ends of the cord being hooked over wires in the bead.

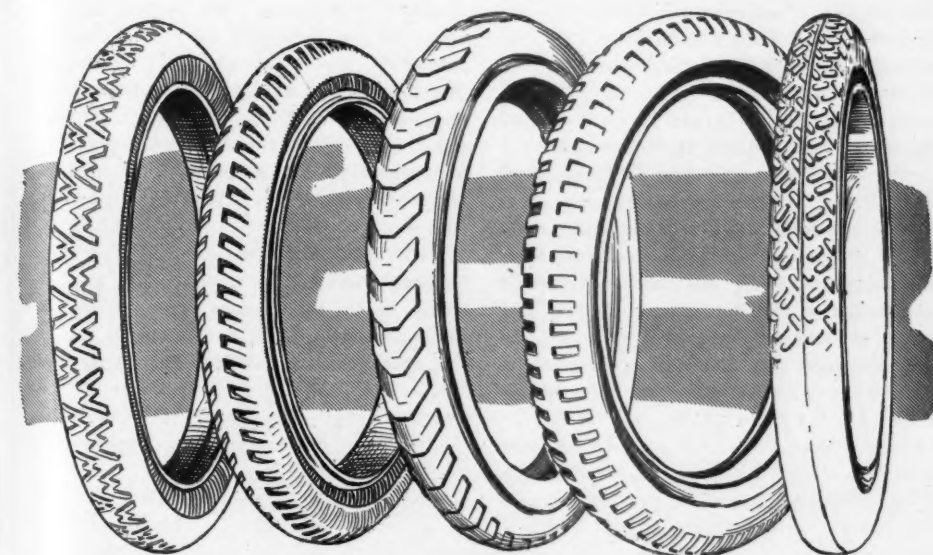
Fisk—The only difference for the new year in the construction of Fisk tires is in the manufacturing details. There is no change in design or in general features of the tire. In the field of non-skid treads the Fisk Rubber Co. pins its faith this year, as previously, to the Bailey tread, and carries no other style of anti-skid casings. In addition to the bolted type of tire which this company makes the leader there is also marketed a Fisk clincher tire in either Bailey or plain treads, as well as the usual line of inner tubes and tire repair accessories.

Goodrich—The Goodrich line for 1912 contains only one new feature and that is a new non-skid tire, which is illustrated on these pages. The different types

they do not rip off. The white tread has for several years been a distinctive feature of this line of tires.

Republic—The Republic staggered tread is the chief feature of this line and shows no change from its construction in preceding years. In this tread long, substantial studs project from the heavy tire base and are an integral part of it, both being formed in one operation. These studs are in six rows, arranged near to each other and with the intervals between the studs in one row so placed as to come directly opposite the studs in the rows

pear this year, as last, with two varieties of tread, the usual round type or plain tread and a vacuum-cup tread, which is now entering its third season. The tread of this tire is formed of a series of six rubber cups set close together, which by keeping a suction hold on the surface of the road prevent any tendency to skid. The suction action is said to have no retarding effect, as the edge of each cup is automatically raised by the rolling of the wheel after reaching each hole. These vacuum cups are integral with the casing proper and are about the

Goodrich
MasterStandard
X-ShapeGoodrich
BaileySimplex
V-TreadCar Spring
CellularMiller
LetteredRussian
CulombHardman
Sure GripBatavia
SecurityShawmut
Block

of Goodrich tires in addition are the regular clincher, quick detachable, straight bead, and the Palmer Web 400 tire for electrics. All of these are made in either smooth tread, Bailey tread or the new non-skid. The new non-skid is called the master tread and in shape and arrangement consists of projecting rubber studs which suggests a chain of thick rubber buttons running around the tire. These buttons are particularly large and are inter-connected to make more certain that

adjoining on either side. The result is a broad, smooth, easy tread. A departure for this year is the application of this tread to solid tires for electrics. The new solid tire for electrics is in the clincher form and has a base of hard rubber instead of soft rubber as formerly. Republic tubes are unique in that they have a spiral black line running around the red Para gum that forms the main body of the tube.

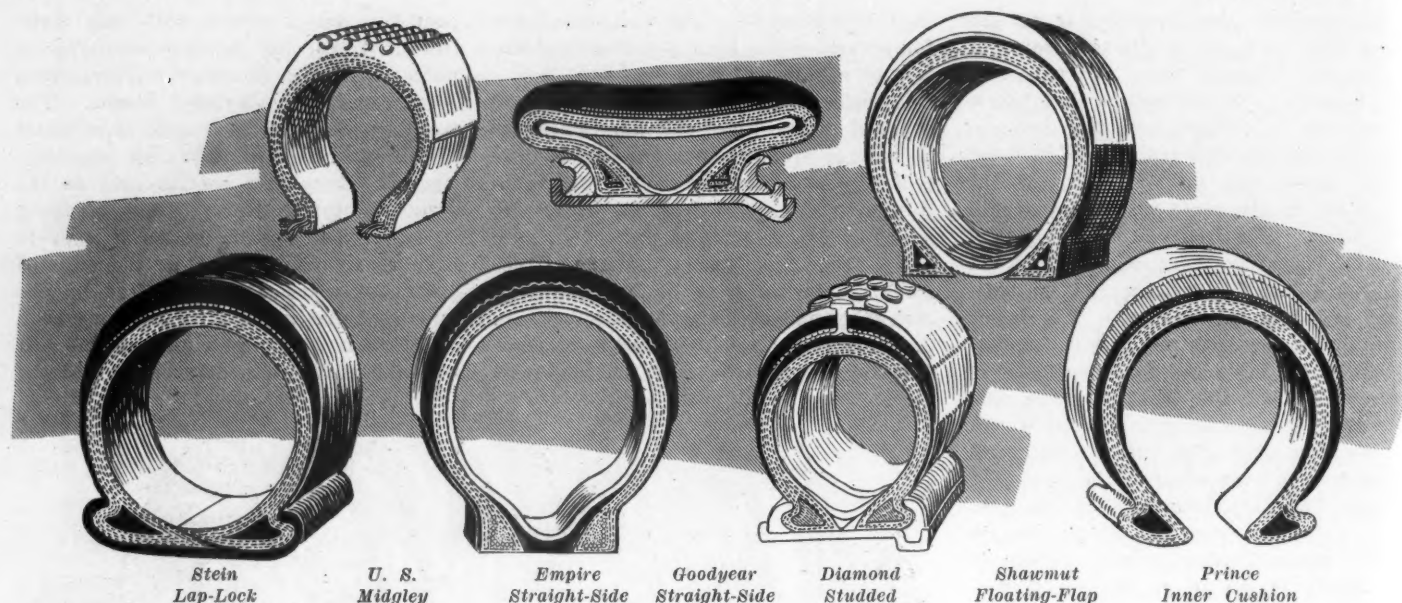
Pennsylvania—Pennsylvania tires ap-

pear this year, as last, with two varieties of tread, the usual round type or plain tread and a vacuum-cup tread, which is now entering its third season. The tread of this tire is formed of a series of six rubber cups set close together, which by keeping a suction hold on the surface of the road prevent any tendency to skid. The suction action is said to have no retarding effect, as the edge of each cup is automatically raised by the rolling of the wheel after reaching each hole. These vacuum cups are integral with the casing proper and are about the

same thickness, so that the life of the tire as a whole is somewhat greater than that of the plain tread. A new type of quick detachable tire is offered, which has a wire base so designed that the maximum of air space is provided within the casing. Pennsylvania inner tubes are unique in that they are without a joint or splice.

Kelly-Springfield—Kelly-Springfield tires, a product of the Consolidated Rubber Co., appear for pleasure car work as both solids and pneumatics. The pneumatic tires are made in round and Bailey treads and, like most of the others, are made in interchangeable sizes. This enables the use of a heavier tire on the rear wheels without necessitating a change of rims. Solid tires are provided for use with either light commercial cars or electric vehicles. The feature of this line is the block tire for heavy trucks.

Federal—A feature of the tire line of the Federal Rubber Mfg. Co. is known as the extra service tire. It appears in both the smooth wrapped tread and the rugged tread non-skid types and is supplied as regular clincher, detachable clincher and straight-wall detachable types. The non-skid feature of the rugged tread consists of a series of large knobs arranged in parallel, three in a row, and forming an integral part of the tread. These knobs flare or expand outwardly at the base, offering a larger traction sur-



face as the knobs wear down in service and acting as reinforcement against possible tearing off of the studs under severe skidding strains. When the tire is inflated and carrying a normal load, these knobs form a flat line across the tire at the point of contact with the road, thus providing a large gripping or traction surface and numerous skid-resisting points at any angle.

Swinehart—So far as pneumatic tires are concerned there is very little change in the Swinehart line for 1912. The standard wrapped tread two-cure process is continued. The features of the Swinehart line are in the cushion and solid tires. The anti-skid cushion cellular tire for electrics and light delivery work is provided with a tread which is perforated with numerous half-inch cells extending to the base on an angle of about 45 degrees. These cells are designed to grip the pavement by vacuum effect and prevent skidding. They also provide a space into which the rubber flows under compression, making the tire more resilient than a solid tire would be and also permitting the heat of friction to escape more readily. The anti-skid pneumatic is provided with a series of criss-cross lines at an angle of 45 degrees to each other, so that there are diamond-shaped depressions in the tread, giving a vacuum effect as well as presenting sharp corners against skidding.

Ajax—No change has been made in Ajax tires during the past year. They appear in two forms, a plain wrapped tread and an extra-heavy non-skid tread. The non-skid tread is formed by cutting deep slots at an angle of 45 degrees in both directions across the tire. This leaves diamond-shaped studs which are designed to grip the road surface, prevent side slip and improving traction.

Empire—Newest in the Empire line is the straight-edge quick detachable tire. This, like the older clincher type, is made with wrapped treads instead of molded treads, as is the more usual custom. Em-

pire tubes are distinguished by their color—a brilliant red—and are made in two grades, the Peerless, which is an extra thick tube, and the Standard, which is ordinary thickness. In connection with these the company markets a tire preserver or reliner. This is an endless band of fabric and rubber that fits snugly between the tire and inner tube extending from edge to edge of the casing.

Lee—Another novelty in anti-skid design is the zig-zag tread of the Lee Tire and Rubber Co. The zig-zag arrangement of the projecting surfaces are shown in one of the illustrations. These projecting strips are designed to provide a resisting surface to slip in any direction. A puncture-proof tire is also an improvement in this line. It has three layers of copperized steel disks in the cushion of the tire, the copper plating of the steel disks being to prevent damage by rust. This company is another of the firms marketing red inner tubes, although gray inner tubes are also supplied. Although this company has manufactured tires for motor car use for only two years, it has been engaged for over a quarter of a century in the manufacture of rubber goods of other descriptions.

Stein—Stein tires have always been unique in design in that the inner edges of the casing are made to overlap, to prevent the entrance of dirt and water. They are known as lap-lock tires. The anti-skid tire supplied by this company is known as the lap-lock tractor, and the tread consists of a series of raised rubber cogs or ledges at right angles to the road, so as to supply traction on heavy or slippery roads. A continuous ridge around the middle periphery prevents side slip. The tread is backed up by a heavy and substantial carcass, which is thoroughly reinforced. In addition to the tractor there is supplied a plain tread of the usual type, but with the lap-lock construction.

Standard—Tires of the Standard Tire and Rubber Co. appear as a new line of

wrapped tread tires in both smooth treads and a new anti-skid design. In addition to this there are the usual lines of tubes and reliners.

Shawmut—The block tread non-skid is a feature of Shawmut tires this year, as in the past. The anti-skidding portion of the tread consists of small blocks or lugs formed upon the base and pointed in opposite directions at an angle of about 45 degrees, with a central ridge around the periphery of the tire. The angular disposition of these blocks provides a resisting surface to slipping either longitudinally or sidewise. The plain wrapped tread is also provided and this with the non-skid may be obtained as plain clincher, quick-detachable clincher and straight-side or Dunlop types. This company also comes forward with a molded floating flap, which takes the place of the old type of flap cemented into the tire.

Batavia—The Batavia security tread tires are featured as an anti-skid and the tread is in appearance very much the same as that on the non-skidding tire of the Seamless anti-skid. The transverse ridges are designed to give great pulling effort without slipping of the wheel and the longitudinal central ridge prevents a tendency to skidding.

Seamless—The non-skid tire of the Seamless Rubber Co. is illustrated herewith, and it will be seen that the tread consists of a wide central ridge from which crosswise lugs project about every half inch around the tire. These are about ½ inch in width and become shallower as the edge of the casing is reached, so that as the tread wears down an even surface will be presented to the road. This formation of tread gives a good grip for tractive effort as well as provision by the central ridge against side slipping. The final vulcanization of Seamless tires is effected as what is known as the single-cure process, which is claimed to give complete homogeneity to the tire. A feature of the Seamless line is the use

of the red inner tube which is standard with this company.

Russian—Prowodnik tires, a product of a factory in Russia and supplied by the Russian Tyre Co., New York, are furnished as either flat or round tires, steel studded anti-skids or rubber non-skids. The rubber non-skid tread is illustrated herewith and consists of a series of angular lugs on each side of the tread, which meet the center ridge in a V-shape like an arrow head. This tire is called Columb.

Prince—The principal feature of the Prince tire is the patented inner rubber cushion composed of an $\frac{1}{4}$ -inch rubber layer inside the inner fabric, the makers holding that most tire troubles are caused, not in the outer rubber tread nor in the fabric itself, but in improper protection of the fabric canvas from tire strains of all kinds, combined with the unavoidable admission of moisture to the inside of the fabric layers of the tire. This tire is a new one on the market this year and is supplied in the plain wrapped tread design.

Hardman—Another recruit to the rank of tire manufacturers is the Hardman Tire and Rubber Co., which is producing single-cure tires. A feature of this line is the Suregrip non-skid casing. The anti-skidding portion of the tread consists of a series of transverse bands about the wearing surface at an angle to the rim as shown in one of the illustrations.

Portage—Portage Rubber Co. is producing a line of plain tread and anti-skid pneumatic tires as well as block tires for truck use. The non-skid tread is known as the Daisy. The tread on this tire is formed by a series of small lugs much like the Bailey tread except that they are arranged in groups of five like the petals of a daisy and six of these groups are disposed in a row about the face of the tire, as shown in one of the illustrations. Plain tread tires are also supplied in this line.

New Jersey—Tires of the New Jersey Car Spring and Rubber Co. are supplied

in both the plain tread and anti-skid styles. Both are of the one-cure wrapped-tread design in which the complete casing is built as a unit and cured as such in one operation to insure uniformity of vulcanization and adhesion of the component parts. The anti-skid tire has in its tread a central row of circular holes, while along each side and disposed between two adjacent holes are semi-circular depressions, which diminish in thickness towards the edge. This is shown in one of the illustrations. Red inner tubes also are a part of this company's line.

Miller—Miller tires, like those of Firestone manufacture, employ the use of letters to provide the irregularities needed to prevent skidding and to give traction in anti-skid treads. With Miller treads the initial letter M alone is used, the letters facing away from the center in both directions. The zig-zag effect thus produced provides an efficient holding face.

Michelin—Michelin tires have always been unique in two respects—the very dark color of the rubber employed in the tread and the series of circumferential lines about the tread. The latter feature provides an effective safeguard against skidding. This company was one of the first to market the red inner tubes. A steel grip tread, shown on another page, is included in the line of this maker.

Endurance Tubes—There are at least two firms manufacturing tubes for the American market who do not make casings. One of these is the Endurance Tire and Rubber Co. The chief feature claimed for Endurance tubes is the thickness of the walls, which prevents loss of air through pores and reduces pinching, chafing, etc.

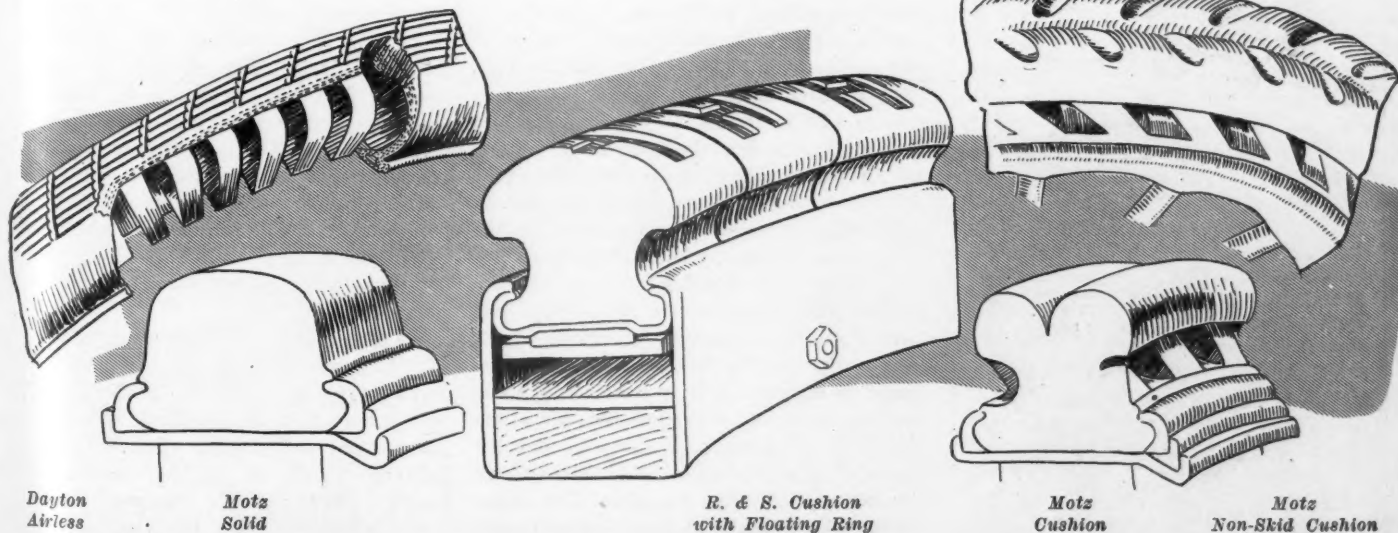
Continental-Erie Tubes—The Continental Rubber Works is another firm manufacturing a line of tubes but no casings. These tubes are in two grades—the Continental-Erie and the Liberty. Continental-Erie tubes are made of several distinct layers of rubber, three in the smaller sizes and four in the larger. These layers are all vulcanized together, without

seams or splices. They are furnished in either gray or red. Liberty tubes are of the same stock, but a lighter grade.

Motz—Motz cushion tires for electric and other service where pneumatics are not desired exhibit slight change from the designs followed in the past. The chief change this year is the application of a non-skid tread to the tire. Motz cushion tires consist of an outer tread connected to the base by blocks or piers of rubber which are formed integrally with the rest of the tire. These piers are at an angle with the radius of the wheel. In addition to this the tire tread is deeply grooved in its center so that encountering an obstruction not only do the piers fold momentarily in upon themselves, but the grooved tread tends to flatten out. The anti-skid feature has been obtained by cutting deep V-shaped notches.

Dayton Airless Tire—Dayton airless tires have the appearance of pneumatics, but the casings contain instead of air piers or columns of rubber designed to give sufficient strength to support the car and yet deflect or squeeze down to absorb obstructions as in a properly inflated pneumatic. They are furnished with plain or threaded tread.

R. & S. Tires—A non-pneumatic tire for electric and similar service which is made of blocks of rubber and yet has the cushion effect necessary for easy riding is the R. & S. tire, made by the R. & S. Flexible Rim Co. The cushion effect is obtained by the peculiar combination of tire and rim. The tire consists of a series of rubber blocks cut out at the tread with H-shaped deep grooves. The bases of these blocks are flanged out and rest on a flat steel ring, which is placed under compression in assembling and held so by the pressure of the blocks. The steel ring is free; that is, there is a space of 1 inch or more between the inner circumference of the ring and the outer circumference of the rim. Consequently, pressure on one block will cause the ring to become slightly eccentric, the pressure being absorbed all around.



Dayton
Airless

Motz
Solid

R. & S. Cushion
with Floating Ring

Motz
Cushion

Motz
Non-Skid Cushion

Vibration Motor's White Plague

National Shows Afford Opportunity for Inspection of New Shock Absorbers

Different Methods Adopted by Car Makers To Guard Against Fractures Caused by Crystallization

VIBRATION is the tuberculosis of the motor car, as one maker of shock-preventing devices puts it, and the idea is worthy of elaboration. Just as the bacilli of the white plague permeate and weaken the whole of the human mechanism to eventually break down the weakest organ, so do the continued vibrations set up throughout the car by road use gradually affect its structure, the malignant symptoms appearing at first only as loosened nuts and connections, finally to culminate in a serious fracture of some part due to crystallization of its metal.

Much is accomplished toward elimination of vibration by pneumatic tires, much must be credited to spring suspension. But this problem of spring suspension is as complex and difficult as it is important. Not only the safety of the mechanism, but the comfort of the passengers must be looked to as well. If springs

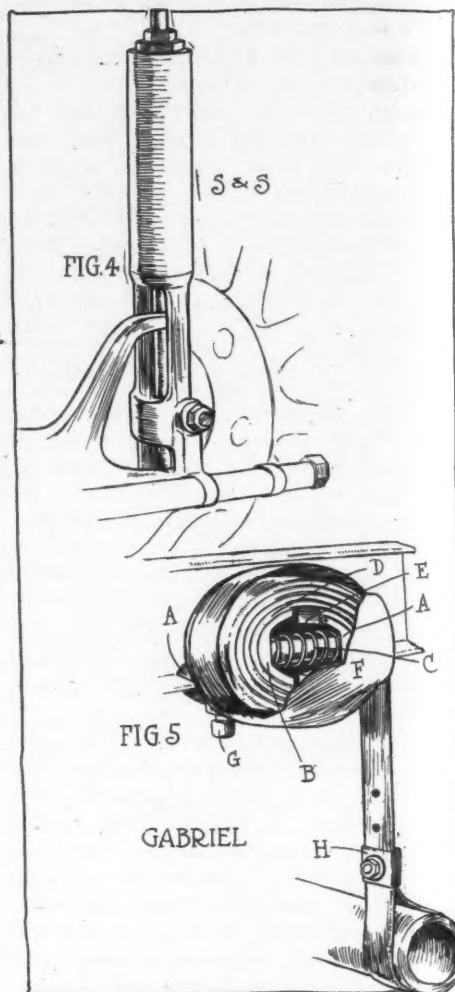
that are too stiff are used, the situation of the travelers in the back part of the car becomes unbearable; if too flexible springs are employed there is a risk of deformation through the sharp stroke of the counter shock. It is to obviate this inconvenience of too stiff or exceedingly flexible springs and to preserve an average flexibility suited to the weight of the car that devices for absorbing the energy of road shocks are applied in addition to the springs.

Shock absorbers may be classified as coil spring, flat spring, friction, wedge, hydraulic and pneumatic types and a comparison can best be gained from consideration of examples of each class as exhibited at the shows. Of the pneumatic type, however, there are no examples to be seen.

There are three different locations to be noted. First and by far the most usual location is at the middle of the springs, between the car frame and the axle; second, a location at the end of the spring—that is, the substitution for the stiff spring shackle of one that is elastic and springy; and, third, appearing this year for the first time, on the front axle to give a springy steering knuckle.

In the following are given the features of some of the types noted at the shows:

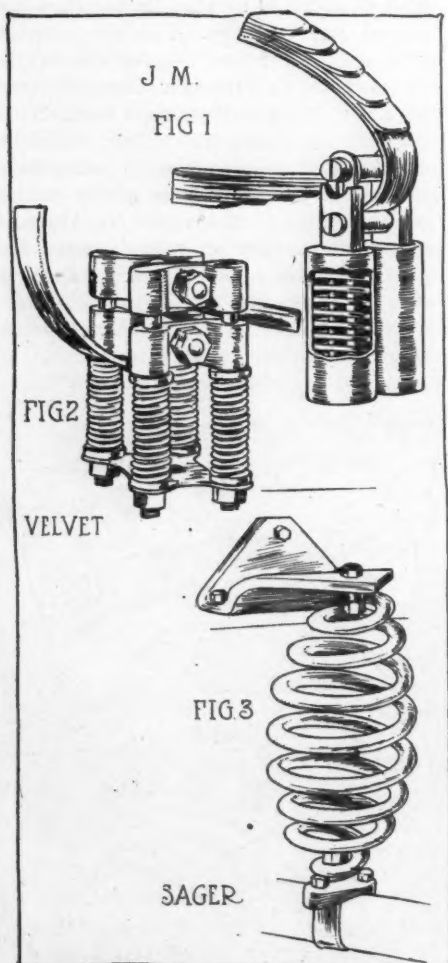
J. M.—Several examples of the coil type of shock absorber are on view. Among them is the J. M. shock absorber, Fig. 1, made by the J. M. Shock Absorber Co. It is arranged to be attached to the end of the spring and consists of two barrels, in each of which there is a plunger which is held normally at the bottom of its stroke by a coiled spring shackle bolt. The connection of the regular car spring at its end is replaced by two bolts, one of which attaches the stationary portion of the shock absorber to the upper part of the spring in the case of elliptic or three-quarter elliptic springs, or to the car frame when semi-elliptic springs are employed. The lower portion of the car spring is connected by the other bolt which passes through the U-shaped upper end of the absorber plunger. The arrangement is illustrated in Fig. 1. As the car springs tend to come together when the car strikes a bump, the action is retarded by the compression of the coil springs in each of the two barrels. The major shock which would be transmitted to the



car body is thus broken up into a series of small vibrations, which also tend to damp the rebound. This design of spring is new in America, but has been employed for some time in Europe. The casing of the barrel makes the device dustproof.

Velvet—Velvet auxiliary springs, made by the John W. Blackledge Mfg Co., operate on the same principle as those just described. They are illustrated in Fig. 2. It will be seen that in place of the two springs, four are employed at the end of each car spring and the housing is absent. This latter feature makes them more accessible, but not dustproof. Side-sway is prevented by making the sliding blocks long enough to act as guides for the plunger rods, thus permitting free vertical motion, but no lateral motion. These absorbers are made in five sizes to accommodate any weight of car and fit three-quarter elliptic, platform and elliptic springs with scroll ends. There is a very strong auxiliary spring of the same design for use on heavy trucks.

Sager—Sager shock absorbers made by J. H. Sager Co. are of the single coil spring type, as illustrated in Fig. 3. They are intended to be attached between the frame and axle rather than at the end of the spring, as in the two previous cases. These springs are oval in form, as it is believed that the varying diam-



ter of the coils gives more nearly equal action under different road shocks than do the cylindrical springs. They are attached to the frame by an L-shaped hanger and to the axle by a clamp which fits the latter. They have 7 years of service to their credit.

S. & S.—Insofar as the construction of the shock-absorbing portion of the device is concerned the S. & S. shock absorber is of the coil spring type. In all other respects, however, it is different from the customary designs. The chief departure from ordinary practice is in the location on the front axle, or rather on the steering knuckle, instead of at the rear. In fitting these a new steering arm, tie-rod and steering knuckles are supplied, as one of the features of this arrangement is the increased ease and safety of steering obtained. They really are interposed between the front axle and the wheel.

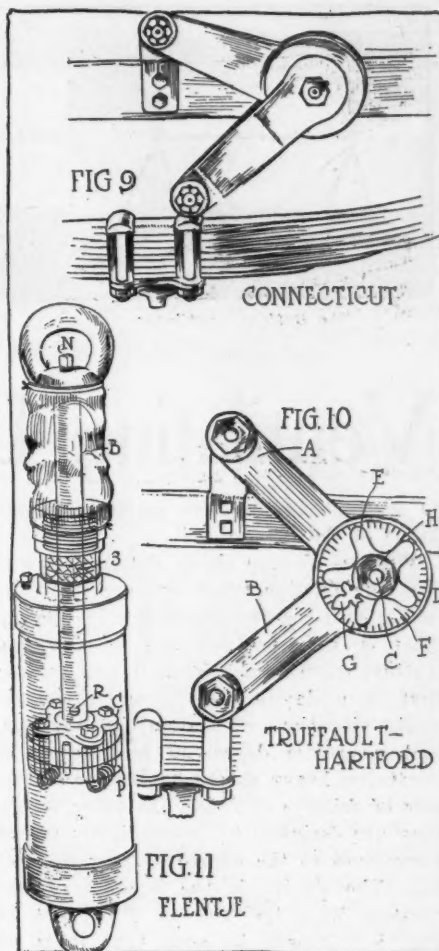
The arrangement is illustrated in Fig. 4, in which it will be seen that the front wheel hub is attached to the barrel of the absorber and the axle to a plunger, so that any relative motion between wheel and axle in a vertical direction will operate on the plunger. A coil spring in the barrel will be compressed by movement of the plunger and shocks which would otherwise be transmitted to the axle and thus to the car are taken up by the resilience of the spring. It will be noticed that the device has no relation to the springs and does not affect their

action except as it relieves them of work.

The wheels with the new steering arrangement entailed by the device are balanced midway on the knuckle pin, the same play being allowed them perpendicularly. The rebound of the car springs then is equally distributed between downward and upward pressures, instead of their entire reactive energy being directed upward, with resultant pitching of the car. In explaining the need of the absorption of road shocks at the front of the car rather than at the rear the manufacturer cites the fact that it is much easier to pull a wheelbarrow over a bump than to push it over, reasoning from that case that the rear wheels of the car will follow with less effect from bumps than the front ones. The device is the product of the S. & S. Shock Absorber Co.

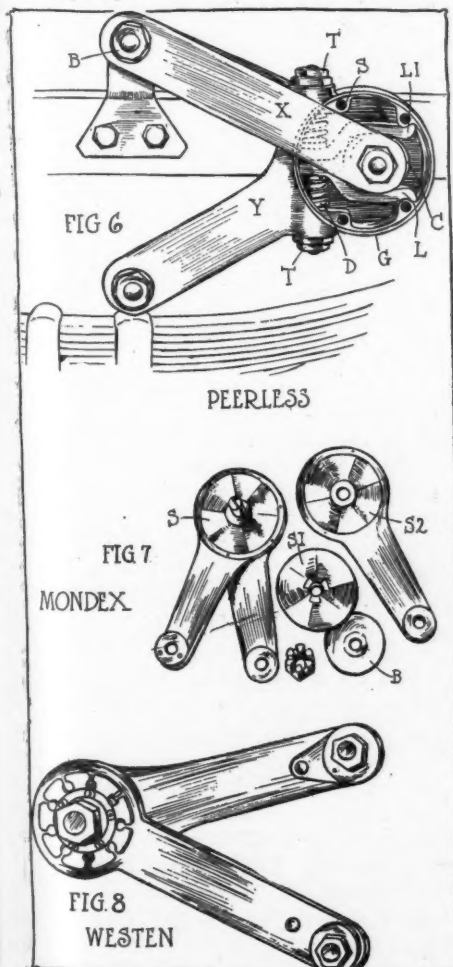
Gabriel Rebound Snubber—Among the products of the Gabriel Horn Mfg. Co. is the Gabriel rebound snubber, which is illustrated in Fig. 5. It is a combination of the coil spring and friction types of shock absorbers. It consists of a circular base divided into halves, one of which—A—is also a clamp containing a setscrew G by which it is affixed to the frame of the car. The other half B is movable, being supported on a stud in the casting A by a sleeve around which is a coil spring C. The two-piece base is encircled by four coils of belting D faced with flexible metal band E. The latter is attached to the base A and enclosed in a dustproof case F. The belting is secured to the axle by a steel clamp H. When the wheels come in contact with an obstruction, causing the car springs to compress, the slack in the belting is taken up by the expansion of the coil spring C, then as the springs begin to rebound the coils of metal-faced belting rubbing over each other cause a friction resistance that increases gradually as the coil spring C compresses, and in proportion to the severity of the shock. This action tends to steady the springs, prevent their breaking and give easy motion to the car body.

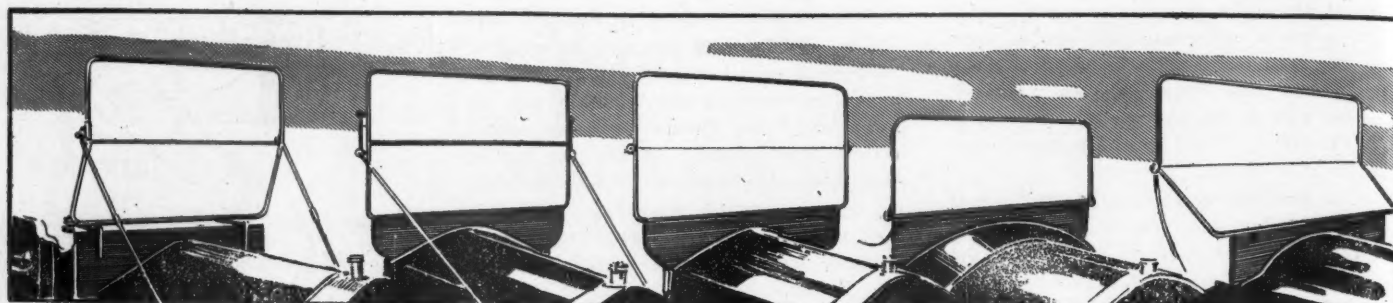
Peerless—A shock absorber which has the appearance of the straight friction type, but depends for its action on a coil spring is known as the Peerless and is marketed by J. H. Sager Co. It is illustrated in Fig. 6, which shows one side of the case removed. It is seen that the device is of the conventional scissors type, employing two arms, one of which, X, is attached to the frame, while the other, Y, is attached to the running gear. The lower arm Y is integral with the grease-filled case G, while arm X is divided and telescopes the case where it actuates a two-throw cam C. The cam is located between two hardened levers L and Ll fulcrumed at one end and resting on two coil springs DD at the opposite end. The outward ends of these springs rest on adjustable stops SS. As the cam is rotated in either direction it



opens the levers and compresses the springs, and the further the cam is rotated the greater the compression and resistance. The resistance may be regulated by the tension adjusting nuts TT. In action the Peerless shock absorber does not kill the resiliency of the flat springs over small obstructions, as the cam allows about 2 inches of unrestricted action; after that the resistance increases as the body and axles come nearer together or recede from each other. The arms have bronze bushings B working on hardened studs provided with grease cups.

Mondex—One of the wedge type of shock absorbers is the Mondex, marketed by the Aristos Co. It is of the scissors form and is arranged to be bolted to the frame and clamped to the axle. The principle of operation is the compression of rubber by a series of inclined planes against smooth rolled brass. The inclined planes are formed on the round steel plates S, S1 and S2 of Fig. 7. The smooth brass plate is shown at B. In conjunction with the friction effect there is a wedge effect, due to the plates rolling upon each other. This expands and contracts disks of rubber which increase in resistance as the rubber is compressed, so that a heavy shock meets with much resistance and a light one with little. The difference between the downward motion and the upward or recoil of the spring is met by the greater compression of the rubber on the upward movement. This





The Bottom Ventilator

The Vertical

The Clear-Vision

The Torpedo

The Zig-Zag

SOME OF THE DIFFERENT TYPES OF WINDSHIELDS OFFERED ON THE 1912 MARKET

Ventilating Devices Windshield Features

is accomplished by the variation in the angle of the planes.

Westen—Westen shock absorbers are of the true friction types and are what the maker calls the two-degree friction design. That is, they are designed to offer two distinct degrees of frictional retardation; first, a moderate retardation to control slight vibrations of the springs, and, second, a greater degree of retardation, to neutralize heavy shocks by the use of two sets of friction surfaces. In other words, they are designed to automatically adjust themselves to the degree of vibration set up. The device is the product of the Westen Mfg. Co. and is illustrated in Fig. 8. It will be seen that it is of the scissors form and is provided with an indicating dial for adjustment. It is made in three sizes for different loads.

Connecticut—Shock absorbers produced by the Connecticut Shock Absorber Co. are of the scissors type, Fig. 9, but operate through the resistance to bending of flat steel springs. The working parts consist of a three-faced cam acting between three sets of springs arranged in the form of a triangle. These springs are located inside the retaining shell with a piece of anti-friction metal inserted between the face of the cam and the spring to eliminate wear. The grease-tight case is packed with grease to further remove possibility of friction. The triangular arrangement of the springs is to take the side strain off the cam hub bearings. The new model of this device is arranged to adjust itself in the neutral position, the 1912 feature being an external locking nut by which the adjustment is made permanent. On account of the shape of the cam, the device exerts practically no braking effect during the normal movement of the car. The springs are brought into action but slightly until there is an excessive movement of the car body up or down, in which case the cam rides on the springs, exerting a braking effect in proportion to the relative movement of the arms; that is, the variation in distance between the frame and axle.

Truffault-Hartford—The Hartford Suspension Co. has the Truffault-Hartford shock absorber, illustrated in Fig. 10.

Admission of Air to Car through Shields Made Necessary by Popularity of Fore-Door Bodies—Clear-Vision Types of Protectors Gaining in Favor

CHIEF among the features of windshield development for 1912 as evidenced by the exhibits of the Madison Square Garden show is the appearance of the ventilating shield. The almost universal adoption of fore-door bodies by car makers necessitates a method of admitting fresh, cool air to the forward compartment

of the car where the heat of the engine is most felt. In the summer months, ventilation of this part of the car body is a necessity and though most of the newer bodies are provided with ventilators, there are many in which other means of air circulation will be welcomed.

Ventilation through the windshield is

Briefly described, it consists of a single arm A and a double arm B, joined by a bolt C and adjusting nut H. Arm A is made of spring steel and carries a flanged cover D, forming a cup-like space on each side. In these spaces are the friction plates. Each of these is covered, a single flanged steel disk fitting in the cover attached to arm A to protect the friction plates from dirt and water. Any desired degree of friction may be obtained by the nut H, while an adjustment dial F and indicator G provide means of securing the correct tension. A spider compensating spring E takes up wear automatically to keep the friction uniform. Four sizes of shock absorber are offered.

Flentje Hydraulic—Radically different in design and operation from any of the other shock-preventing devices described, the Flentje depends upon the dash-pot

idea for its action. The hydraulic principle upon which it operates has been employed for years in other lines of engineering, and in the absorption of the recoil of the big guns of coast defense and the navy. The principle is simple. In a cylinder full of liquid there is a plunger perforated with small holes, so the plunger can be moved up and down gently with little effort. The liquid readily passes through the holes from one side of the plunger to the other. When the attempt is made to move the plunger violently, however, the resistance increases greatly. This is the way the hydraulic shock preventer works. It is illustrated in Fig. 11.

As shown in Fig. 10, a seamless brass cylinder is filled with a mixture of oil and mica. The bottom of the cylinder is attached by means of the ring to the axle, while to the ring on the plunger is attached the car frame. The plunger carries an adjustable valve nut H to regulate the opening of the recoil hole in the piston rod. Varying the rate of oil flow determines the resistance of the absorber. Working in the cylinder is the piston P, which has seven vertical holes in its head, all of which open on the down-stroke of the piston when the car strikes a bump. On the up-stroke or recoil the clapper valve closes four large holes, leaving three small ones open. The piston stuffing box S filled with braided rawhide packing held in compression by a coil spring. A leather boot B protects the piston rod or plunger from damage from dust.

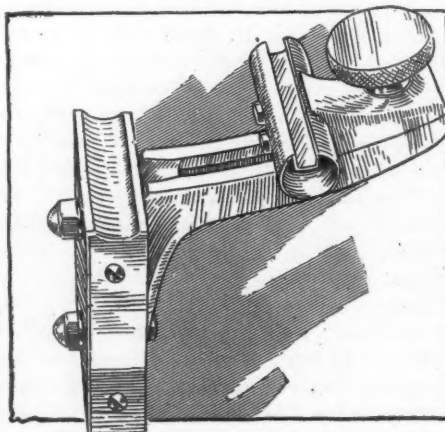
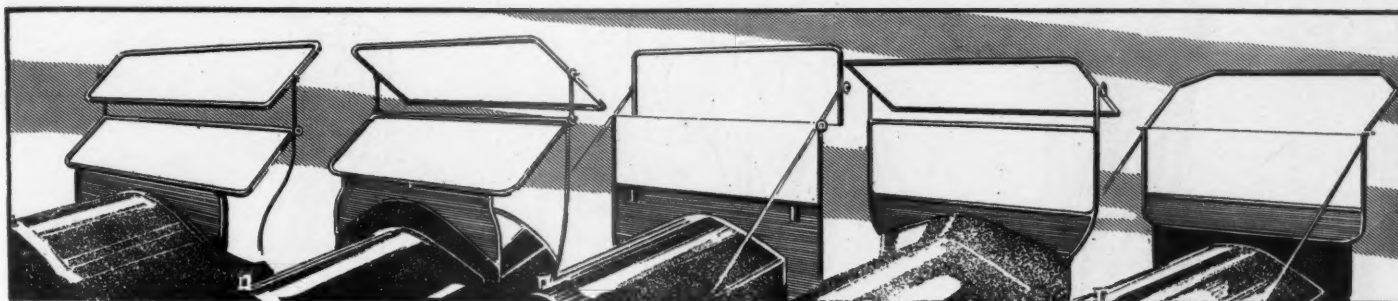


FIG. 1—GEMCO VENTILATING BRACKET



The Zig-Zag Rain-Vision The Zig-Zag Ventilator The Vertical Ventilator The Top Ventilator The Upward Slope
VARIOUS WINDSHIELD POSITIONS, ANY OF WHICH ARE GIVEN BY THE UNIVERSAL TYPE OF SHIELD

Protecting Passengers from the Elements

Rain-Vision, Torpedo, Universal, Zig-Zag, Ventilating, Folding and Straight Types of Windshields Produced—
Universal Can Be Put In Any Position

provided in three ways. In the simplest method and one which is at least 1 year old, this is accomplished by tilting the upper panel of the shield forward or backward, or by moving the upper panel bodily forward or backward, the panel remaining vertical. The only objection to this method is that the air is not always directed where most needed, usually striking about the edge of the front seat, or the laps of the occupants, instead of down at the floor boards from which the heat comes. The second method, and the new one, is in the provision for displacing the bottom of the lower panel inwardly from the dash or filler board to direct the air downwards. This arrangement may be permanent, as in one case described below, but usually a method is provided for adjusting the space at the bottom of the shield. The latter method takes the form of inwardly projecting brackets with slots or guides in which the shield can be locked with a thumbnut. Such arrangements are offered by several of the makers and three of them are illustrated herewith. One of the manufacturers is marketing a bracket by which any folding shield may be made self-ventilating. The third method is by the insertion of a ventilator in the filler board.

The torpedo type of windshield is more in evidence this year than before. The torpedo is a single-glass design, but slightly higher than the lower half of the more common double-panel shield. This is made possible by the heavily hooded dash of the torpedo, and by the fact that both the seats and top are lower. In general it is hinged at the base to swing forward horizontally over the dash or backward over the steering wheel.

Clear-vision Type

The clear-vision windshield is decidedly more popular this year. The term clear-vision is one much used in windshield parlance and refers to the type in which the metal strips across the middle of the shield where the glass is divided have been

omitted. It frequently occurs that the division between upper and lower panels of glass comes right in the line of vision, and two metal bands are more obstruction to the sight than the thin dividing line formed by the polished edge of the glass itself. An objection urged against the clear-view by some is that the upper panel in particular is more liable to break with its bottom unprotected, and in case of breakage the pieces are more liable to fly back into the faces of the passengers. A great deal of thought has been put on the method of holding the glass on three sides. Some of the arrangements of frame by which this is accomplished are shown on another page.

Rain-vision Shield

The rain-vision shield is one in which the upper panel may be tipped forward at the bottom to form a sort of watershed and give the driver a clear view of the road. A type of shield that is finding more favor every year is that known as the zig-zag. In this the lower panel is at an angle and affords better protection to the front-seat occupants than the straight type, for cross currents of air are cut off. It is often made so that the top half not only swings down over the bottom panel, but

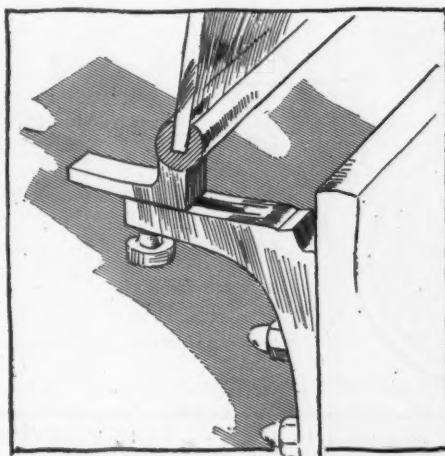


FIG. 2—POLSON VENTILATOR

both panels may be swung forward over the hood by means of a hinge at the base. The rain-vision vertical ventilator, top ventilator and similar positions are obtained on both straight and zig-zag styles by the use of an arm hinged at its lower end at the dividing line and at its upper end at, or near, the middle of the top panel. Any of these may or may not be clear-vision.

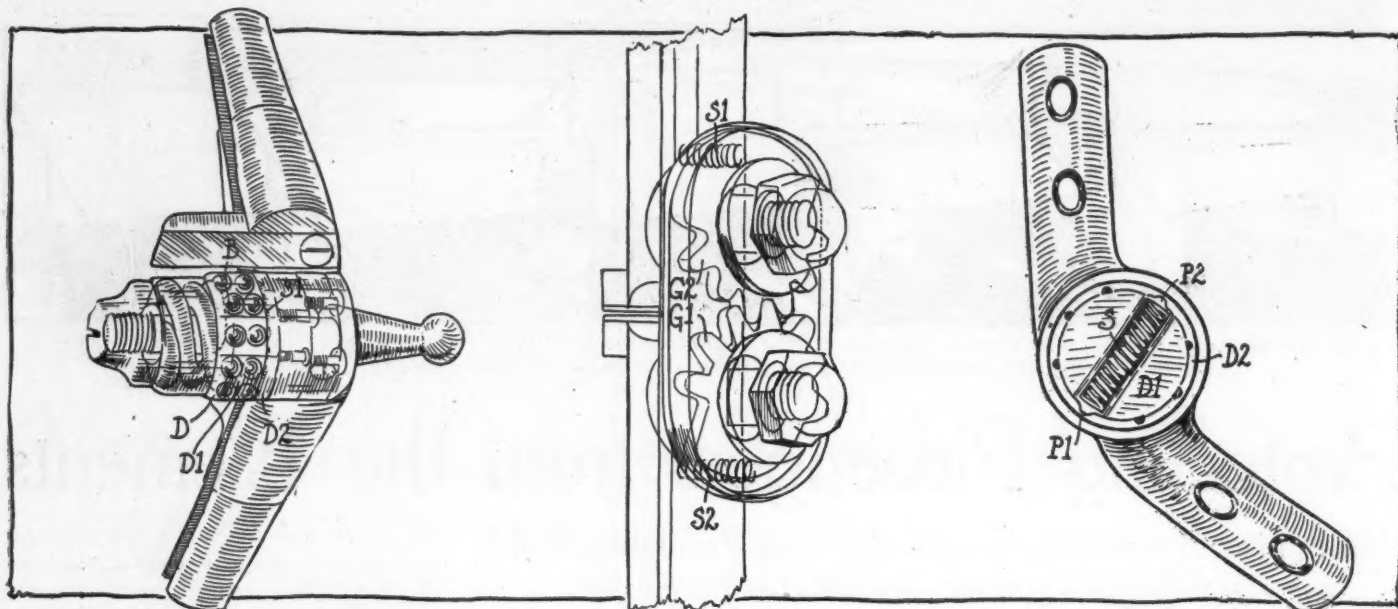
Automatic Locks

At these hinges, there must be some means of locking the panels in position at whatever angle they may be placed, either by tightening the joint with the hand, or in the more common way of an automatic lock in which it is only necessary to pull the panel into position. One of the earliest types of automatic locks was the friction type in which three disks are used, the center one being of fabric or leather and the outside ones of metal. The outer disks are the hinged parts, integral with the upper and lower panel frames. A stiff coil spring surrounding the hinge bolt presses the disks together, thus locking them in place.

Another type is the locking ball in which the hinge portion is in the form of two thick metal disks, the two coming together face to face. In the opposite faces are a series of sockets, four in one and six in the other. The four sockets are the deeper and carry four balls, so that the balls come to rest in any position where the sockets in the two disks meet, and are locked in this position by a spring. In one make three disks with two rows of balls are used.

Plunger Lock

The plunger type of lock is in appearance much like the ball and socket type. The upper half of the hinge is a thick disk in which are mounted two plungers diametrically opposite and held outward by springs. The lower half is merely a cup-shaped cover, carrying six or eight sockets into which the ends of the plungers are forced by the springs. The spring and ball lock operates on exactly the same principle except that balls replace the plungers. In some instances a radial roller lock is used where one disk has three diametrical slots and the other two slots



BANKER DOUBLE BALL RATCHET HINGE LOCK. THREE DISKS D, D1 AND D2 CARRY HEMISPHERICAL SOCKETS IN WHICH ARE BALLS B. DISKS ARE HELD TOGETHER BY SPRING S AND LOCK WHENEVER SOCKETS COINCIDE

GEAR LOCK OF BOREAS WINDSHIELD. THE TEETH OF GEARS G1 AND G2 ARE HELD IN MESH BY SPRINGS S1 AND S2 AND LOCK WHENEVER IN MESH, SO THAT SIMPLY PULLING UPPER PANEL INTO DESIRED POSITION LOCKS IT THERE

EAGLE STANDARD FRICTION HINGE. A COMBINATION OF FRICTION AND PLUNGER TYPES IN WHICH ONE FRICTION DISK D1 CARRIES PLUNGERS P1 AND P2 AND DISK D2 HAS NOTCHES N, LOCKING BY SPRINGS

carrying rollers. The shield will lock whenever the slots in the disks coincide. Much like this is the tongue and groove type, in which one of the hinge disks has diametrical slots, or grooves, and the other a series of diametrical ridges. A last type is that in which a spur gear is employed on each half of the hinge, the two gears being held in mesh by a spring and locking whenever the teeth mesh.

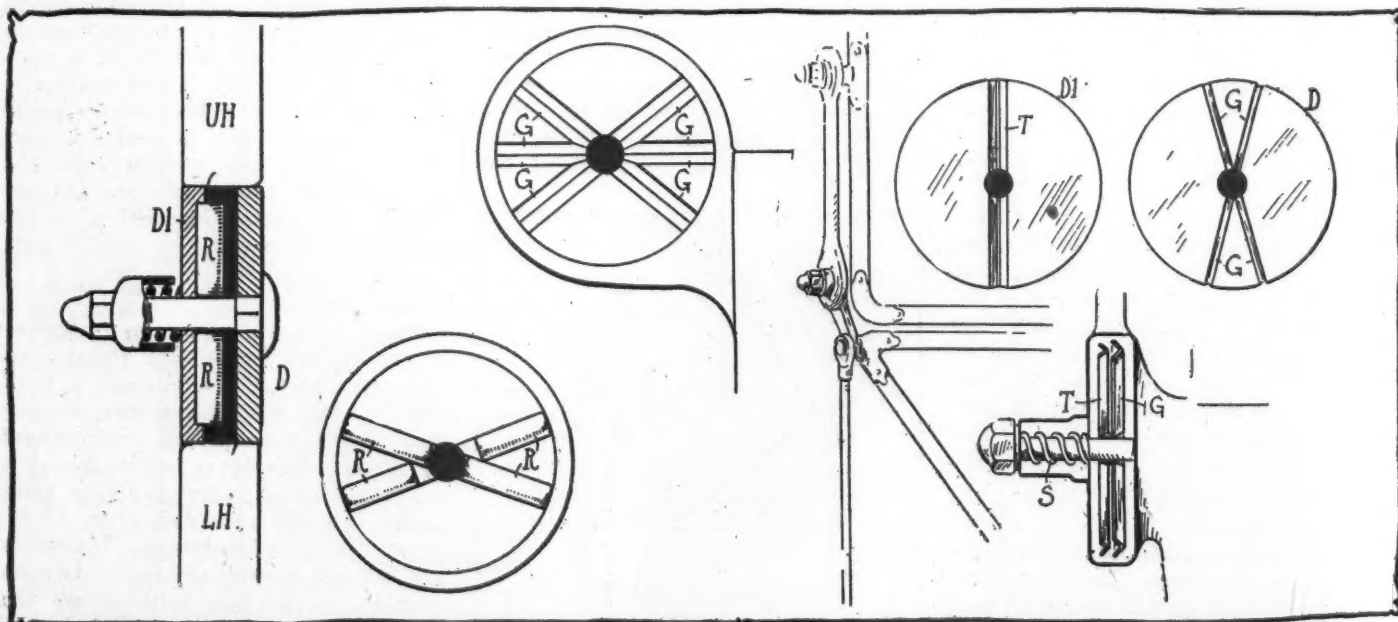
Sprague—Windshields made by the Sprague Umbrella Co. show little change in design from those which have been marketed by this company for the last year. The feature of the Sprague construction is the arrangement of the combination windshield, which is adjustable for all positions. An arm hinged at the middle of the frame is hinged again at its upper end to the top

half of the shield, thus allowing the upper half to take any angle with the lower portion or to give the straight ventilation effect with the upper half vertical and either forward or backward of the main portion. The construction of the automatic central lock is illustrated on this page. All of the Sprague automatic windshields employ the radial roller type of lock. On the model referred to the lower half is hinged to the dash so that it may be set either as straight or zig-zag, or can be folded over the hood. It can be had either as clear-vision or with a middle frame band.

Cox—Cox shields, a product of the Cox Brass Manufacturing Co., are made in six styles, the clear-vision type being featured. The lock is of the spring plunger and ball

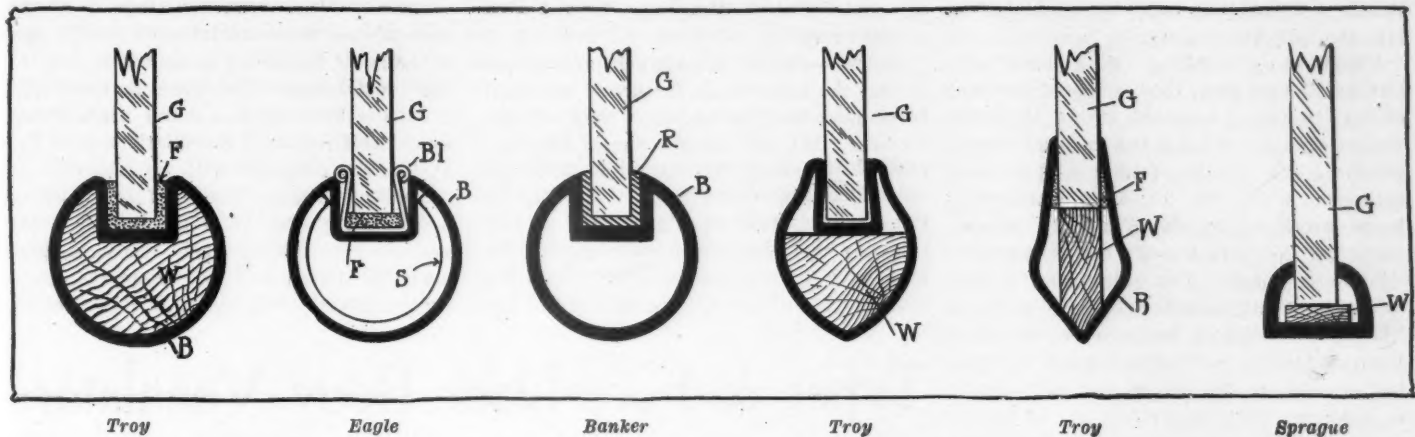
type and is automatic in action. In most of the models the upper half or panel is hinged at its center by side arms in much the same way as the others referred to, so that any position of the upper panel is obtainable.

Troy—Troy windshields for 1912 appear in several new models. All have the same type of automatic locking device, which is of tongue and groove design, and the central suspension of the upper half of the shield by means of a hinged arm in much the same way as is employed in the Sprague. This construction, with that of the automatic lock is illustrated on this page. The model 25 is called the automatic sextette from the fact that six different positions are obtainable. For torpedo bodies the model 27, called the



THE SPRAGUE ROLLER BEARING LOCK; ONE DISK D1 HAS GROOVES G AND THE OTHER DISK D CARRIES ROLLERS R IN SHALLOW GROOVES. A SPRING HOLDS THE DISKS TOGETHER

THE TROY TONGUE-AND-GROOVE LOCK; ONE DISK D HAS TWO GROOVES G AND THE OPPOSING DISK TONGUES OR RIDGES T. A SPRING S PRESSES THE DISKS FIRMLY TOGETHER



SOME OF THE METHODS OF HOLDING GLASS IN WINDSHIELD FRAME. G, GLASS; F, FELT; W, WOOD; B, BRASS, B1, BRASS SPRING; R, RUBBER; S, STEEL TUBING

automatic sextette zig-zag, is offered, with six positions. The model 3 is intended for use with torpedoes or other bodies with low tops. It consists of a single panel arranged to be swung at its middle point as well as at the hinged connection at the dash. These are made by the Troy Carriage Sunshade Co., and are exhibited at the garden by the New York distributors, the National Auto Top Co.

Eagle—The line of shields of the Eagle Co. embraces three styles—the Eagle, the Standard Friction, and the X-L. The Eagle model is furnished in the clear-vision, rain-vision type, both straight and zig-zag, in fact, through the design of the hinges and clips for attaching the filler board it may be attached to the car at any angle and the top section may be adjusted to any position desired. The frame is of heavy brass tubing and the shield is held to the filler board by through clips, each of which is a continuous U-shaped piece extending through a slot in the lower frame. The stay rods are pivoted at the hinge end so

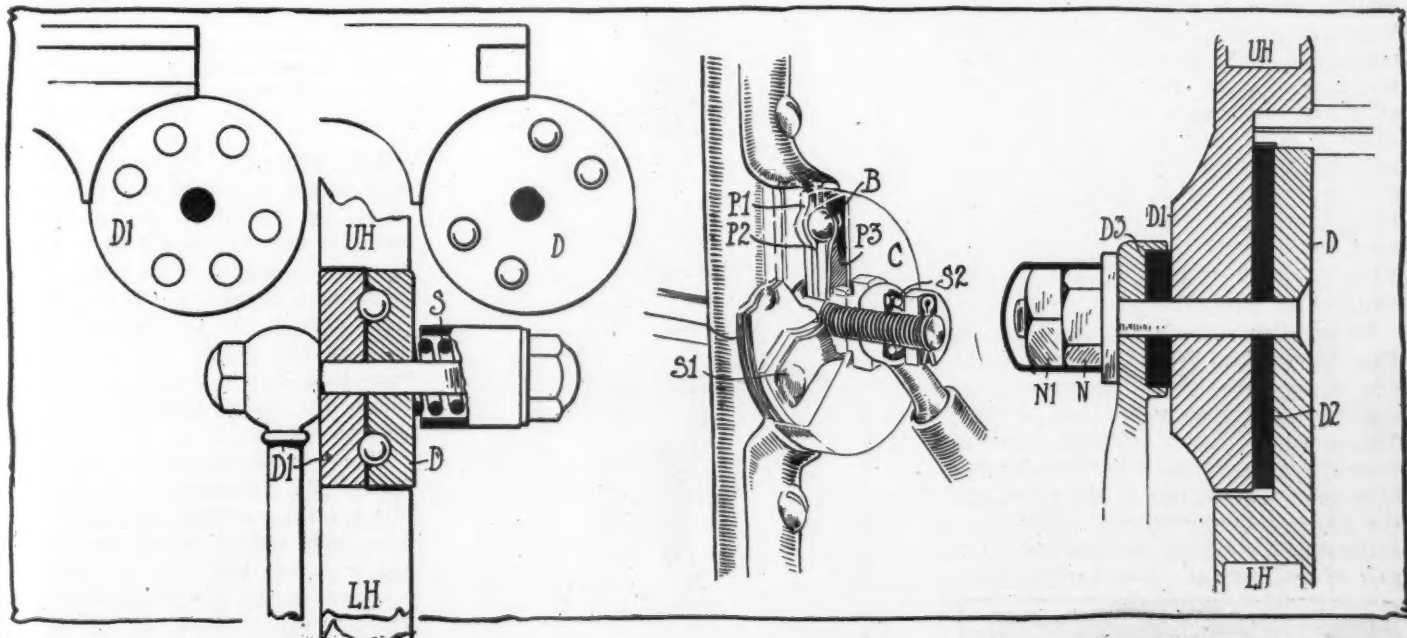
that they may be closed or spread as desired at the lower end without bending. The lower end of the stay rods is fitted with a swivel base which is universal. The hinge is of the friction type, and made of a series of disks, in principle the same as a multiple-disk clutch.

The standard friction shields made by this company are provided with hinges in which the friction and ratchet and pawl principles are combined. The friction is adjustable by means of a nut and locknut on the outside of the hinge independently of the holding position of the pawls and ratchets. The arrangement of the hinge is shown in one of the illustrations. In the clear-vision model, the heavy brass frame is reinforced with a steel lining to make it as unyielding as if cross channels were used. Like the Eagle, the standard friction models in the rain-vision type permit the top section to be used as a ventilator. The X-L model is designed to sell at a lower price than the others but is of standard design throughout, the fittings

being universal. The hinge is provided with locking positions supplemented by uniform friction through a spring which clamps the two halves in contact.

Kinwood—Kinwood windshields, a product of the Kinsey Manufacturing Co., are distinguished by their simplicity and ruggedness of appearance. The automatic hinge is particularly plain, as all the parts of the lock and hinge are covered by plain brass cap. The shields appear as either straight or zig-zag types and clear-vision or otherwise.

Polson—An example of the ball-and-socket type of automatic hinge is in the Polson line. The rain-vision type employs the familiar side arm. Two types of shields giving bottom ventilation are offered; one in which the lower portion of the frame is permanently set up and forward of the fillerboard on light brackets, and the other in which the opening between frame and fillerboard or dash may be regulated. The latter arrangement is indicated in one of the illustrations. These



THE UNION BALL-AND-SOCKET WINDSHIELD LOCK; FOUR BALLS ARE CARRIED IN THE DISK D AND THEY LOCK BY RESTING HALF IN THESE HOLES AND HALF IN THE HOLES IN DISK D1

THE VANGUARD BALL LOCK; BALLS B CARRIED BETWEEN HARDENED STEEL PLATES P2 AND P3, HELD BY SPRING, S1

THE FRICTION DISK AUTOMATIC, D2, BEING A LEATHER DISK BETWEEN THE METAL DISKS D1 AND D2; N AND N1 ARE NUT AND LOCK NUT

shields are made as rain-vision, clear-vision, straight and zig-zag.

Vanguard—Featuring the clear-view self-ventilating type, the Vanguard line includes, besides, the usual styles of rain-vision, straight, zig-zag and torpedo windshields. All of the folding types are equipped with the ball-lock automatic hinge employed by the Vanguard Manufacturing Co. in past years, and illustrated on another page. The rain-vision styles have the familiar side-arm construction. The self-ventilating style, new for this year, employs a horizontal inward extending bracket on the top of the fillerboard, so arranged that the bottom of the lower panel may be swung inward to permit a draft of air on the lower part of the front seat. These are exhibited at the garden by the eastern distributor, Emil Grossman & Co.

Ackerman—In the Ackerman windshields of Joseph N. Smith & Co., a side arm is employed in a slightly different way to obtain universality of position. The stay rods are fastened to the middle of the upper half and are fitted with a joint about 3 inches from the panel. The side arm is attached through a ball-and-socket joint to a short arm fastened to the bottom of the frame of the upper panel and the side arm is arranged to swing from its lower end, which slides up and down on the lower part of the frame in a guide arranged on the latter.

Gemco—Windshields of the Garage Equipment Manufacturing Co. appear in five styles—Milwaukee adjustable, rain-vision, clear-vision, Gemco automatic, and torpedo. In addition to these, there is the feature of this line for 1912, a ventilating bracket which may be applied to any shield for fore-door ventilation between shield and fillerboard. The special bracket is illustrated on another page. The Milwaukee shield is equipped with friction hinges of chrome leather between two plates and with telescoping brace rods which enables the lower panel to be set at almost any angle with the dash, to which it is hinged. The Gemco is a new addition to the line. It is similar in construction to the others except that the lower panel is not adjustable. Black enamel shields with nickel or brass trimmings are offered in addition to the regular line of brass shields.

Boreas—Boreas windshields, made by the Page Woven Wire Fence Co., are shown in five types—rain-vision, clear-vision, zig-zag, folding torpedo and ratchet torpedo. The principle of the lockjoint on these windshields is new, as it involves the use of a pair of gears, one on the upper and the other on the lower panel. The gears automatically lock in any position by a pair of coil springs. The working parts



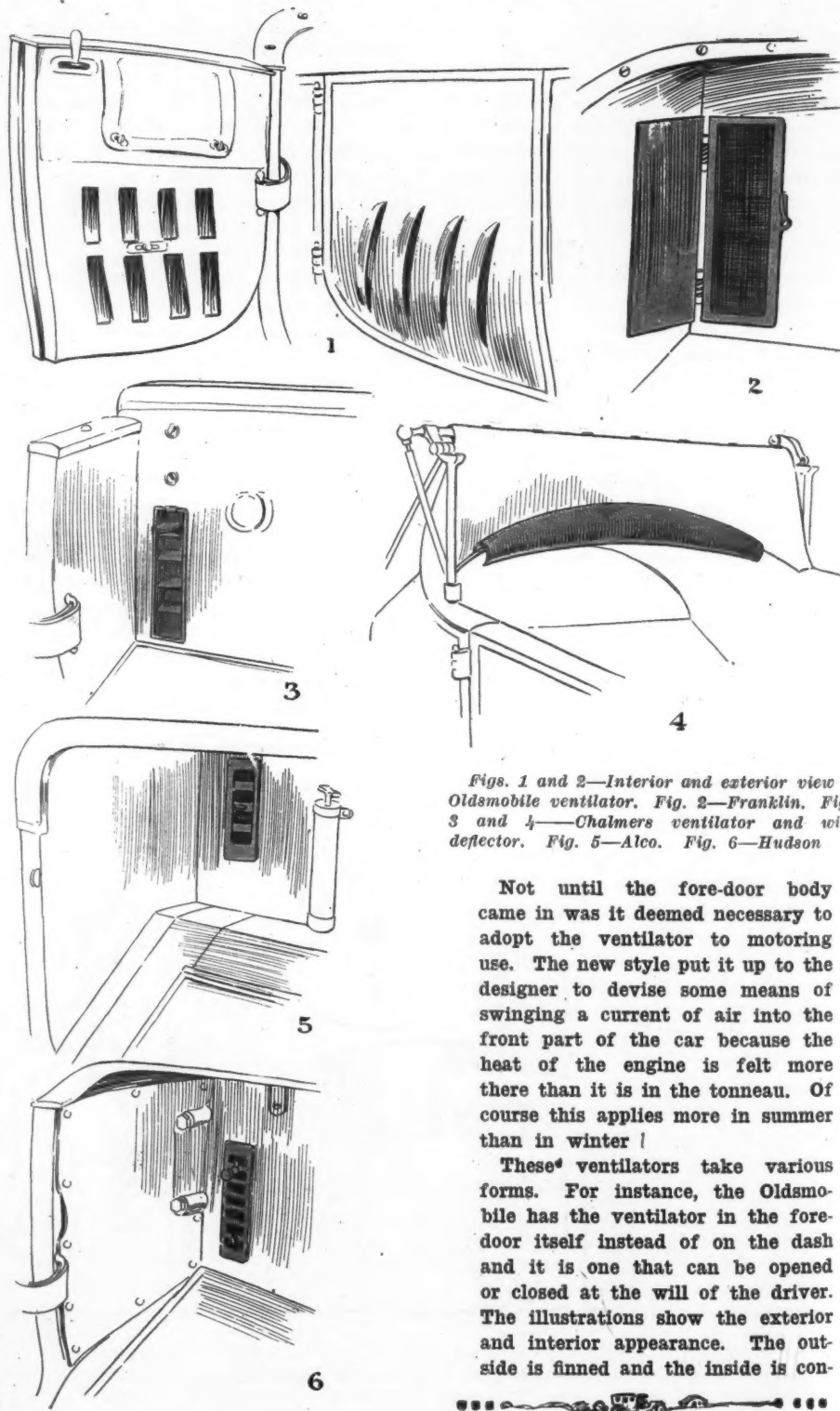
are made of steel stampings, covered with drawn brass.

Banker—Banker windshields are unique in that the clear-vision feature is universal throughout the line and that they are tailor-made, that is, none are carried in stock, each shield being constructed to meet the individual requirements of each car. To the standard types of shields made by this company there have been added during the past year a straight rain-vision shield for touring cars and a zig-zag rain-vision for

roadsters. The automatic hinge is of the ball ratchet type, employing a double row of balls as the lock, as shown in one of the illustrations. The glass in the windshields is held in the tubular brass frame by channel rubber. The fillerboards of the shields are equipped with ventilators.

Folding Shields—A type of shield which made its appearance for the first time last year is the folding style, such as that made by the Auto Wind Shield Co., Cambridge, Mass. This shield is built on the

Types of Fore-Door Body Ventilators



Figs. 1 and 2—Interior and exterior view of Oldsmobile ventilator. Fig. 2—Franklin. Figs. 3 and 4—Chalmers ventilator and wind deflector. Fig. 5—Alco. Fig. 6—Hudson

Not until the fore-door body came in was it deemed necessary to adopt the ventilator to motoring use. The new style put it up to the designer to devise some means of swinging a current of air into the front part of the car because the heat of the engine is felt more there than it is in the tonneau. Of course this applies more in summer than in winter!

These ventilators take various forms. For instance, the Oldsmobile has the ventilator in the fore-door itself instead of on the dash and it is one that can be opened or closed at the will of the driver. The illustrations show the exterior and interior appearance. The outside is finned and the inside is con-

principle that the driver should look over rather than through the shield. Consequently it is designed to deflect the wind to the side and over the heads of the occupants of the car. A light steel frame which slopes back and upward from the hood with a curve to the perpendicular at its top, and at the same time presents a V-shape front to the wind, is covered with leather and the thickest of celluloid sheet. The celluloid is very clear and offers no obstruction to the view of those who pre-

fer to look through the shield. Side panels are provided for complete enclosure, and the whole affair can be folded and put away.

Union—The Union Auto Specialties Co. in its line of windshields for 1912, offers six styles, including rain-vision, double and single folding, zig-zag, straight, torpedo, and ventilating. The ventilating shield is the feature for the year and is shown in the left-hand illustration on page 1. In this a grooved bracket ex-

tending inwardly from the fillerboard permits the lower panel to be swung inward from the dash and locked in position by a thumbnut. All models, including the torpedo, are supplied with automatic lock hinges of the friction, ball and lug type, illustrated on another page, and all are clear-vision.

Deflector—Deflector shields, made by the Deflector Shield Co., are of the folding type in which the air is directed upward and over the heads of the driver and passengers. Arrangement is made for admitting air under them.

Ideal—In addition to the line of the regular type of windshields in the Ideal booth there is shown another of the type of shields which may be folded up and put away. In design this is much like the shield described above. It has the leather and celluloid construction, with upward deflection of the air.

Alexander Individual Shield—A type of shield which has a rather restricted application is the individual windshield. These are usually applied only to racers or other speedy cars where it is desired to protect the driver alone without offering much wind resistance. These are usually round in shape and arranged to be attached to the steering post. Glass is often placed by a wire screen of fine mesh in this class. Such shields are made by the J. Alexander Manufacturing Co., New York.

Windshield Cleaners—In their capacity of protecting the motorist from wind, rain and dirt, windshields are prone to become covered with mud and water which prevents the driver from getting a good view of the road ahead. To reach out over the shield and wipe off the outside of the glass is a disagreeable job, particularly in a rainstorm. Several arrangements are on the market for keeping the glass clean without necessitating that the driver expose himself to the elements.

Security Cleaner—A mechanical device for this purpose is the Security windshield cleaner, marketed by the Emil Grossman Co. It consists of a semi-circular shell, arranged to be slid along the top of the shield. Extending downward from the shell and upon the outside of the glass is a rod carrying a rubber squeegee, which bears upon the glass. An arm extends inside the shield by which the device is moved backward and forward, the rubber cleaning the glass of mud and water.

Glasseo Cleaner—Clean windshields are obtained in a different way by the use of Glasseo, marketed by the Motor Car Equipment Co. There is a liquid with which the outside of the glass is rubbed to prevent mud and water sticking to the glass, just as water runs off a duck's back. It is said that one application of Glasseo will be effective for 4 days.

Riding in Front Made Comfortable

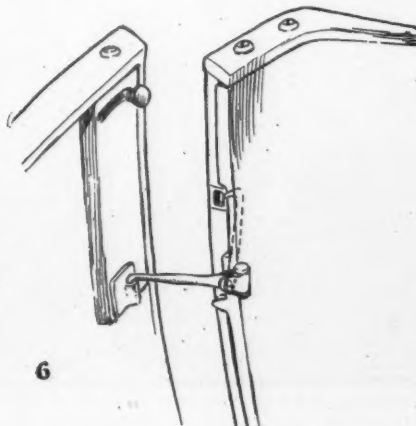
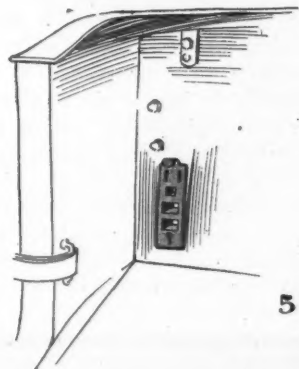
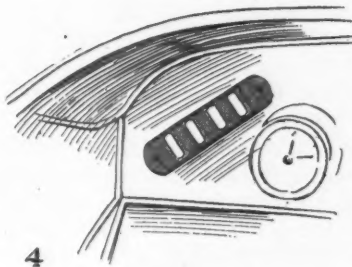
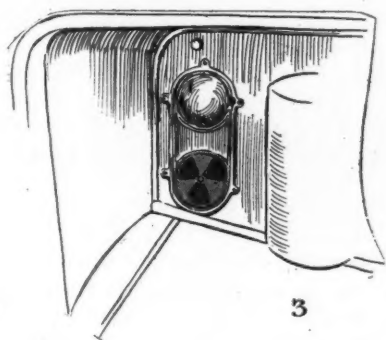
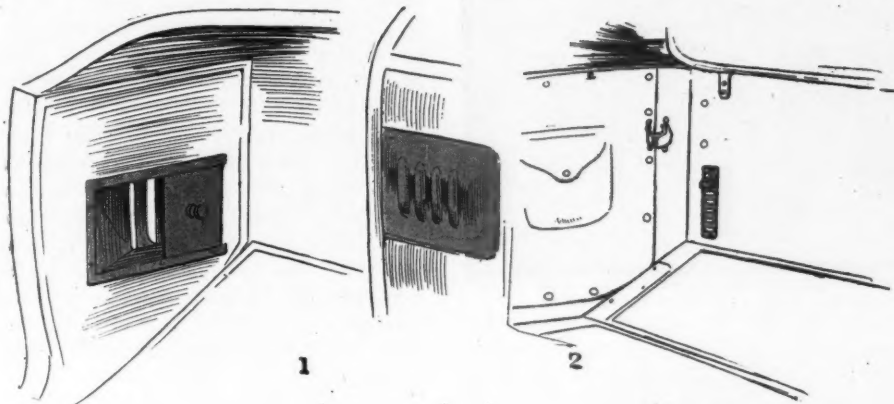
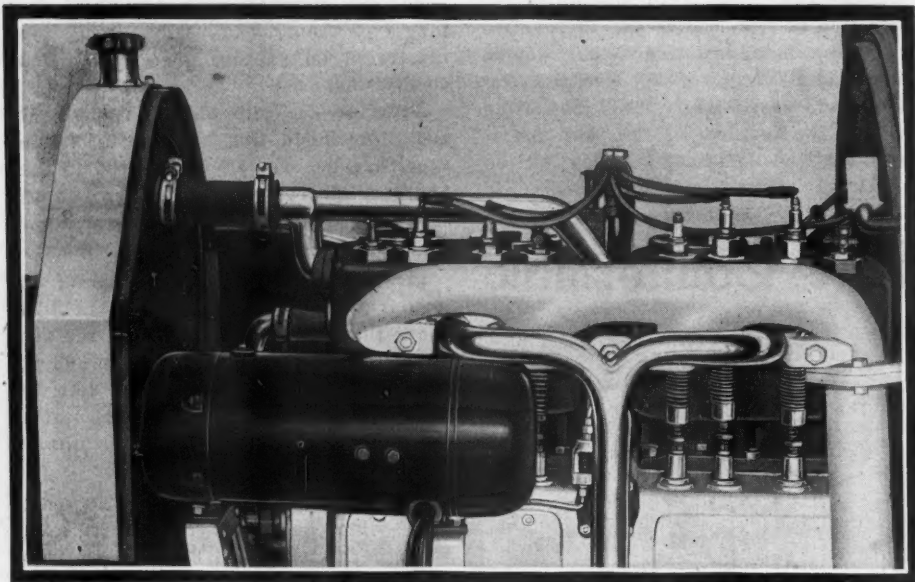


Fig. 1—Premier. Fig. 2—Another Chalmers Idea. Fig. 3—Winton. Fig. 4—Knox. Fig. 5—E-M-F. Fig. 6—Peerless

trolled by slides. The Franklin has a grating which is controlled by a door, while the Chalmers has several ideas. One of these, Fig. 3, shows the ventilator which will let in the hot air from the engine, while Fig. 4 shows a method of inducing air downward into the front compartment by means of a shield which deflects the air currents. The Alco and Hudson are somewhat similar and one also might place the Premier, Knox, Winton and E-M-F in the same category. With the Peerless, Fig. 6, second set, one finds that the door is utilized as a ventilator, there being a catch which holds the door ajar if so desired. This seems a simple solution of the problem.



Beginning of the Crankless Age



MOTOR-GENERATOR OF PARIS STARTER MOUNTED ON ENGINE

ENGINE starters for cars were practically unknown in America until the self-starting Winton appeared 4 years ago. The arrangement was viewed askance at first—not because it failed to fulfill its duties properly, but because it was so much of an innovation. The Amplex followed very soon after and these two cars held the self-starting field until last July, when the Chalmers 36 was announced with a compressed air starter.

After that self-starting cars were announced with bewildering rapidity. Indeed, so great was the landslide toward self-starting as a feature of equipment that a count in the middle of January showed sixty-five American cars so equipped, which is something better than one-third of the American cars on the market.

SELF-STARTER TYPES

Many makers of cars have devised starting systems of their own and others are working on special designs, but the majority are employing some one of the special starting equipments. Of these, there are between forty and fifty announced at present, while others are being brought out at the rate of one or two a week. This does not mean that in every case the devices are produced in a half-baked condition to supply the extraordinary demand for release from the labor of cranking; in most instances, the designs which are being submitted for the first time, were worked out as long as 2 or 3 years ago, and have been undergoing tests and refinements since that time. The makers have merely taken the opportune moment to place their devices upon the market.

The starting of an engine is accomplished by putting a power fuel into the cylinders and igniting it. This may be done in either of two ways—by intro-

ducing a charge in the cylinders and igniting it to supply and ignite a charge in the cylinders in the same way as if it were under actual running condition. On this basis, then, starters may be divided into two general classes. The first, comprising those starting devices in which no preliminary movement of the engine is required, may be classified as ignition starters—a term which has come into use, wide use, within the past few weeks. The second class, including all devices intended to cause the motor to take up its regular cycle of events by rotating the crankshaft, may be called non-ignition starters.

To consider the non-ignition starters first, it may be said that motion is given to the crankshaft in two ways: either by the use of an independent motive device or by transforming the gas engine momentarily into a motor.

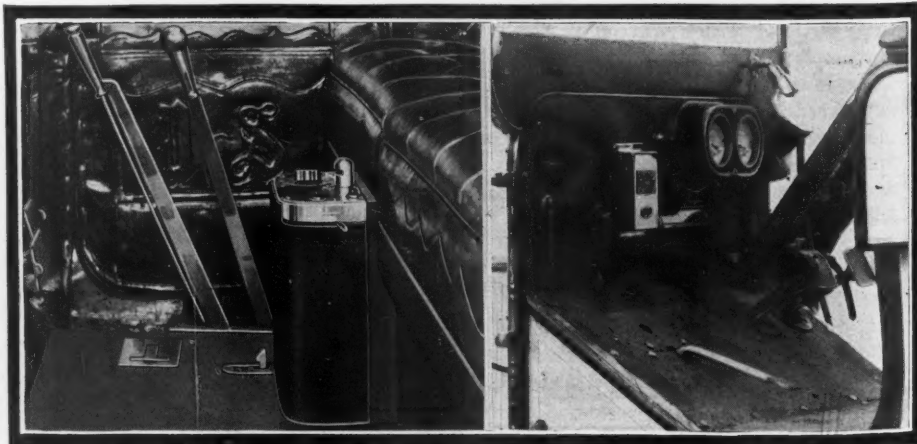
Electric engine starters comprise a combination of electric generator, motor, storage battery and automatic controller. As electric starting systems are usually

Phenomenal Growth of Motor-Starting Idea in Past Year—Engine-Starting Devices Used on Only Two Cars 1 Year Ago

designed, the generator and motor are combined in a single unit which is mechanically connected to the crankshaft through gears or chains. The motor generator unit is arranged to receive current from the battery and with this current as power run as a motor turning the engine over through suitable gearing. After the motor has started, the unit is transformed either automatically or manually into a generator which recharges the storage battery. Since most generators develop currents at a voltage somewhat proportional to the speed at which they are rotated, and also since the storage battery will feed back current to the generator when its voltage is lower than that of the former, there must be a means provided for preventing supply of current to the battery at too high a voltage, and for preventing the battery from short-circuiting itself when the generator is standing still or running at slow speed. Most of the electric starters are designed to provide current for electric lighting as well, while still others are designed to furnish the electric supply for the three functions of starting, lighting and ignition.

The second type of non-ignition starters is the compressed air starter. In these, three things are essential: an air compressor, an air motor and an air storage tank. In some of these, the gas engine itself becomes the air motor by the introduction of compressed air in the cylinder heads so that the pistons are driven downward by the pressure above them just as if an explosion took place.

This method requires an accurately timed distributor by which the air is directed to the proper cylinder at the proper time, in exactly the same way that the



LOCATION OF APLCO CONTROLLER

O'NEILL STARTING PEDAL

Self-Starters Make Motoring Easy

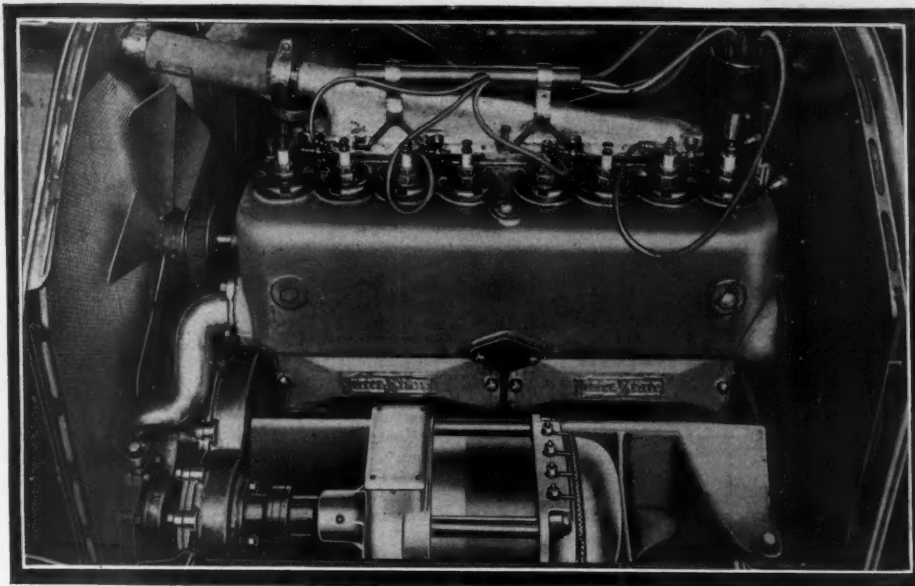
Fifty Different Designs Now on Market—These Include Acetylene, Electric, Air, Gasoline, Mechanical and Lever Types

electric current is distributed to the spark plugs for ignition. In others, a separate motor is attached to the crankshaft through suitable clutch and gearing, so that when air pressure from the storage tank is admitted to the engine it rotates the latter in the same way as does the electric motor.

The compression of the air is obtained in several different ways: either by reciprocating air pump gear-driven from the motor, or by the direct use of the compression and explosion pressure in one or more of the cylinders. In the latter there is a piston air pump on the cylinder head in which the pressure in the cylinder drives the air piston upward and pumps air under pressure into the tank. A still more direct way is a similar one in which, instead of pure air, the compressed or exhaust gases are forced through a check valve in the cylinder head to the tank. The chief advantage of the air starters is that a source of supply for inflating tires is provided.

The last class of non-ignition starters are what may be properly called mechanical starters. In these the energy obtained from previous running of the engine is stored up in the springs and held there until released to turn the motor over for a subsequent start.

Ignition starters include those in which a charge of some explosive fluid is introduced into the cylinder and exploded by a spark in just the same way as the mixture from the carbureter when the motor is running. So far, only two fluids have been employed commercially for this purpose. The logical method is the least extensively employed, that is by the introduction of gasoline or gasoline impregnated air from an auxiliary tank. The



MOUNTING OF APLCO MOTOR-GENERATOR FOR STARTING, LIGHTING AND IGNITION

chief advantage of this method is that a supply of the fuel is always present or can be obtained almost anywhere.

The newest, but what is today by far the most popular type, is the acetylene starter. In this, either pure acetylene gas or a mixture of acetylene gas and air is introduced into the cylinders and ignited there by a spark. Two methods of introduction of acetylene are employed. The simplest is by introducing the acetylene gas into the intake manifold on the last few revolutions of the motor after the ignition has been cut off. In this way acetylene gas is sucked into the cylinders where it remains for a length of time which depends upon the condition of the motor. Acetylene gas is much heavier than gasoline vapor, being of about the same specific gravity as air, and consequently will remain in the cylinders without great loss.

Another method is to introduce it directly through the cylinder heads either to all the cylinders on a hit-or-miss prin-

ciple or to the cylinder next in order of firing by running it through a distributor timed with the motor.

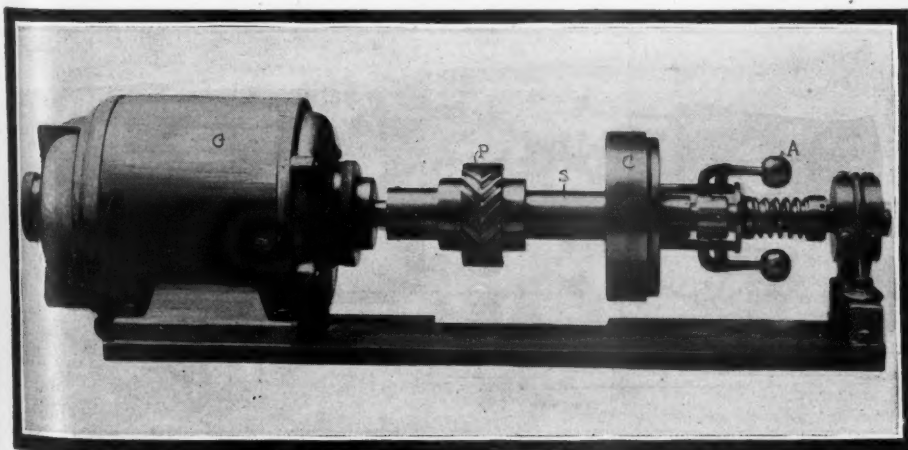
The chief advantage of ignition starters as a whole is that the explosion of the gas required for starting warms up the cylinders and causes the carbureter mixture to ignite even more readily than if the starting occurred through rotation of the crankshaft; also, that the acetylene tank is widely used for lighting.

A class of devices which are improperly termed engine starters are those in which the motor is actually cranked from the seat by hand or foot power through arrangements of levers or straps. While not truly self-starters, they often are as handy, and sometimes much more reliable than the real self-starters.

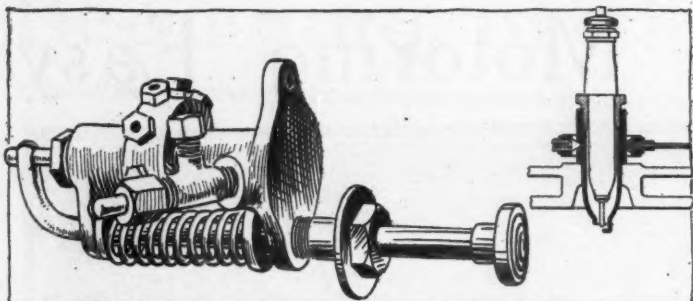
ELECTRIC STARTERS

Delco—The Dayton Electric Laboratories Co. has devised a system in which the lighting of the car and ignition of the motor are combined with the electric starting feature. The plant consists of a compact and powerful dynamo operated by the engine of the car. The dynamo charges the storage battery, but for starting the engine it is automatically transformed into a motor, the current to operate it as a motor being furnished by the battery. The battery has a capacity of 80 ampere-hours and as soon as that capacity is reached the charging automatically ceases.

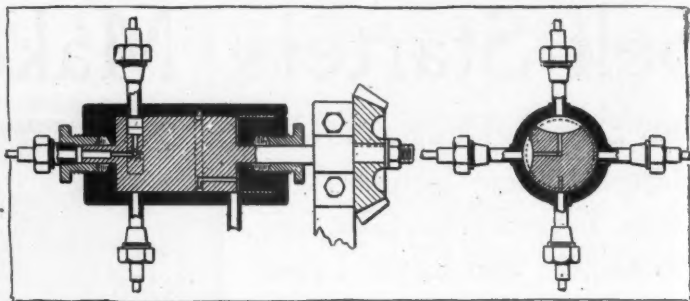
To start the engine the operator must retard the spark and hold it there until he pushes out the clutch with the clutch pedal. When the spark lever is thus retarded the starting switch is closed, so that two things are accomplished: First, the generator is turned over slowly so that the gears will mesh with the teeth in the fly-



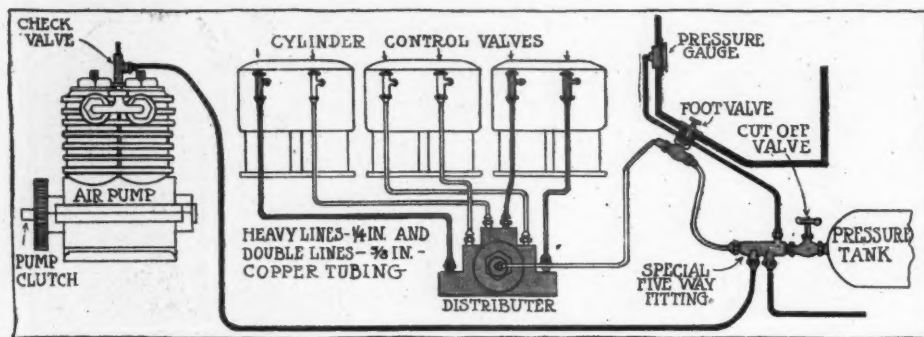
MOTOR-GENERATOR OF O'NEILL COMBINATION SYSTEM



E-Z ACETYLENE STARTER VALVE AND A SPECIAL PLUG



SECTIONS THROUGH ACETYLENE DISTRIBUTER



JANNEY-STIENMETZ COMPRESSED-AIR SYSTEM

wheel; second, current energizes the magnetic clutch, which locks the starting mechanism fast to the clutch pedal. By throwing out the clutch the controller is shifted so that the twelve cells of the battery are connected up in series. The battery consists of twelve cells, arranged in four groups of three cells each. Each group gives 6 volts and for charging and lighting the four groups are connected in parallel, giving a lighting battery of 80 ampere-hours. When connected in series for starting a battery of 24 volts and 20 ampere-hours' capacity is obtained.

Aplco—The electric starting system of the Apple Electric Co., called the Aplco system, combines four important electrical functions, namely, self-starting, ignition, lighting and signaling. The system consists of three units: A combined motor and dynamo, a controller, and a storage battery. The dynamo-motor is attached to the engine by means of a side shaft or through flexible gearing and flanged sprockets and may be applied to any available point along the crankshaft ahead of the transmission. Contained in the head of the dynamo-motor are the reducing gear mechanism and automatic clutches.

The combined starting lever and ignition switch, the switch for the lights, the buttons for the electric horn and dash light are all combined in one unit and are instantly accessible to the driver. The lighting switch is arranged to light the lamps in various combinations and to dim the headlights so that an approaching driver may not be blinded by their glare.

Each controller is fitted with a lock, which prevents the starting device from being tampered with in the absence of the driver of the car and locks the lighting switch in the position in which it is left. A pilot light on the controller box

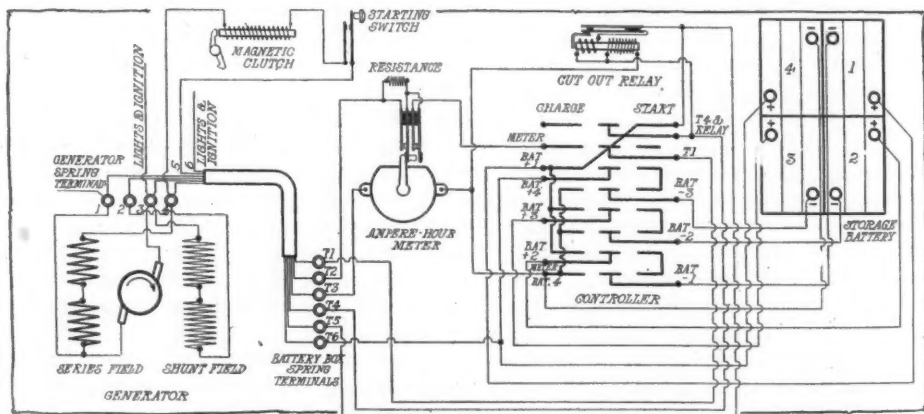
indicates by its glowing that all parts of the system are working properly.

Paris—The equipment of the Paris electric starting and lighting system consists of a complete unit design of motor-generator and transmission about 6½ inches in diameter and 16 inches long, a regulator for controlling the output of the generator to a predetermined value re-

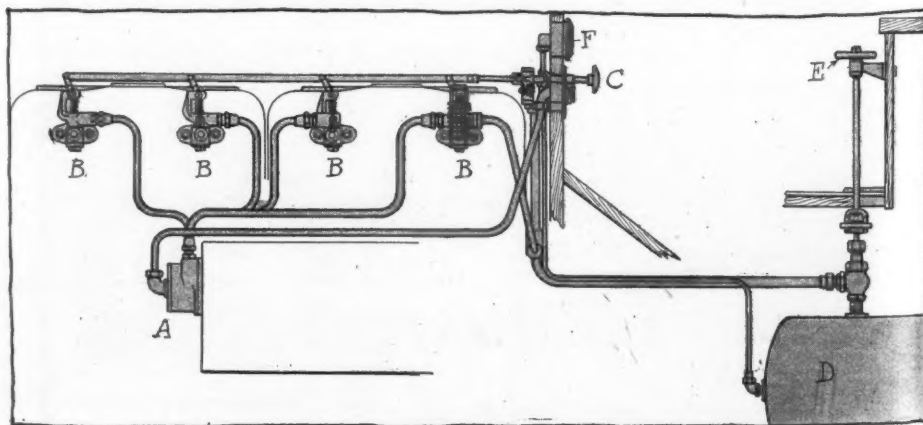
gardless of engine speed, a storage battery, and a multiple-contact push button. The equipment complete outside of storage battery weighs less than 100 pounds. The pressing of the multiple-contact push button energizes the motor from the storage battery and cranks the engine through the transmission which gives the motor the advantage of a 30 to 1 ratio. As soon as the engine runs on its own power the operator releases the push button and the motor is automatically thrown into engagement through a 3 to 1 ratio to run as a generator at thrice engine speed.

The regulator is a compact device for automatically holding the output of the generator constant regardless of engine speed, effecting a taper charge.

North East—In the combined electric starting and lighting system of the North East Electric Co. there is employed a motor-generator, starting switch, lock switch and battery. The storage battery supplies current for starting the engine

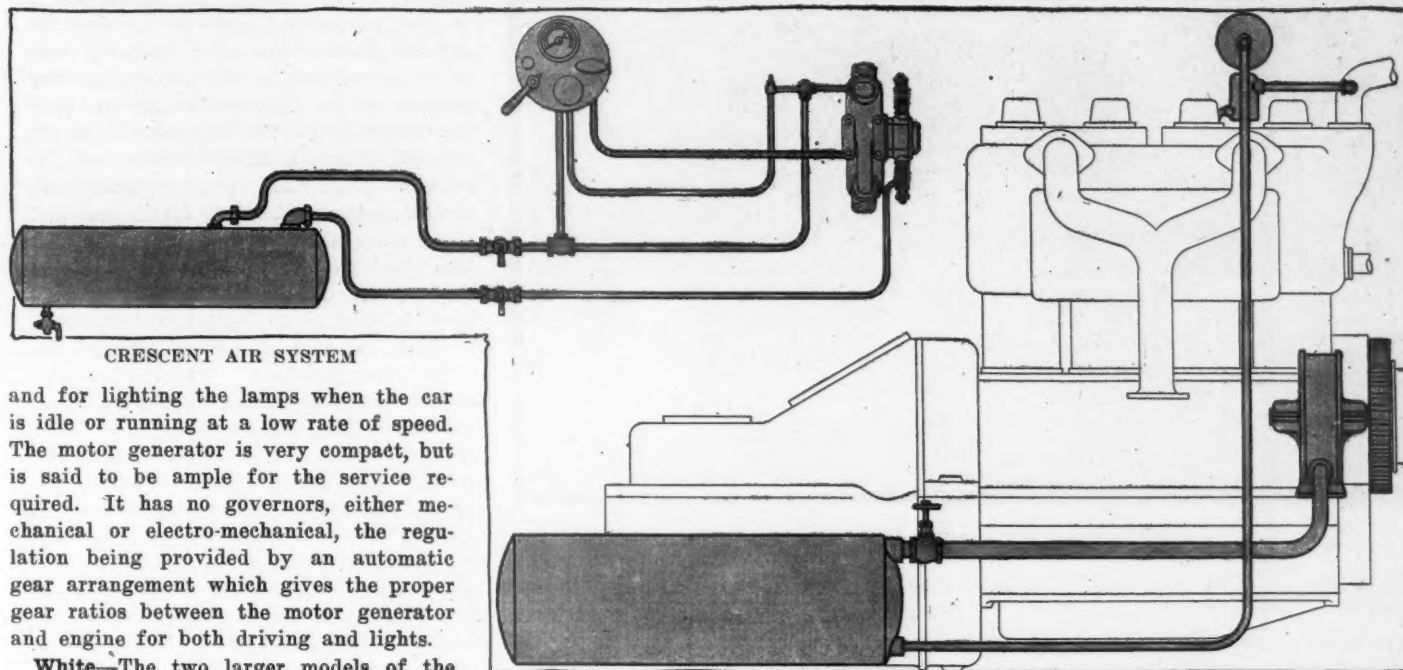


WIRING OF DELCO SYSTEM OF STARTING, LIGHTING AND IGNITION



SIDE VIEW OF AMPLEX AIR STARTER

A, Distributer; B, Ports; C, Pushrod; D Air Tank; E, Shut-off Valve; F. Pressure Gauge



CRESCENT AIR SYSTEM

and for lighting the lamps when the car is idle or running at a low rate of speed. The motor generator is very compact, but is said to be ample for the service required. It has no governors, either mechanical or electro-mechanical, the regulation being provided by an automatic gear arrangement which gives the proper gear ratios between the motor generator and engine for both driving and lights.

White—The two larger models of the White car for 1912 are equipped with an electric starting device designed by the White Co. and the lighting system is combined with it. The principle is a combined motor generator, which, when running as a generator, charges the storage batteries at 18 volts, charging nine in series. In starting the engine it runs as a motor on 18-volt current from the battery up to 200 revolutions per minute. It is driven by silent chain from the magneto shaft. The lamps are so connected that current is delivered to them at 8 volts. It is said that the motor

generator will run the car for 5 minutes.

Hartford—The Hartford Suspension Co. has brought out an electric self-starter whose chief difference in design from the others is that the motor and generator are separate. The motor itself is exceptionally small. It is only 4 inches in diameter and 7 inches long. It is connected with the main shaft of the engine through a gear reduction of 125 to 1 and is located ordinarily between the clutch and gearset. It is designed to run

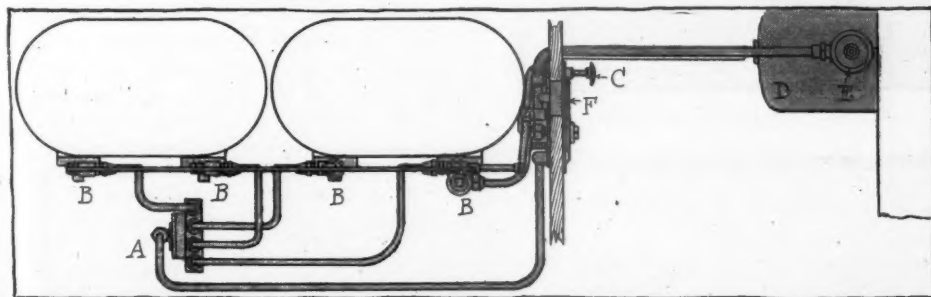
at from 5,000 to 6,000 revolutions per minute. The dynamo is called the Dyneto generator, is 3½ inches in diameter and 5 inches in length and is designed to supply the battery with sufficient current to operate the starting motor and lights.

O'Neill Self-Starter—Unlike any other self-starting device, the O'Neill system consists in vaporizing the gasoline within the carburetor by electrical means, relieving the cylinder compression by unseating the exhaust valves and producing suction, compression and ignition by electrical means. An electrical button which is in circuit with a storage battery and is insulated by enamel, both electrically and chemically, is secured inside the carburetor so that when a switch is closed the gasoline flowing through the carburetor becomes vaporized instantly, thus producing a homogeneous mixture in the coldest weather when suction is created. Suction and compression in the engine are produced by a special form of motor-dynamo.

COMPRESSED-AIR STARTERS

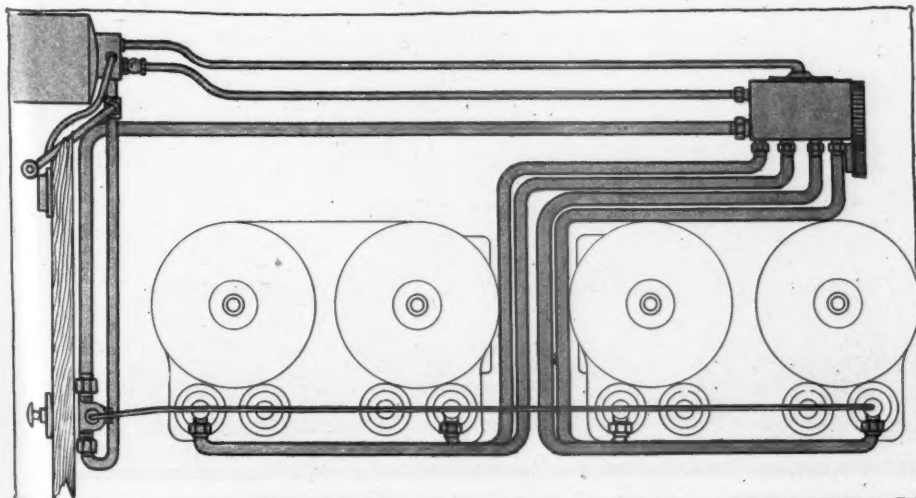
Titanic—Titanic cranking and lighting system is the name of a combined electric system just brought out by the Dean Electric Co. The starting portion consists of a motor driven from lighting battery. It is designed to run as a generator and supply current for lighting as well.

Chalmers—The self-starter with which Chalmers cars are equipped is the design of the Chalmers Motor Co. and is of the compressed air type. It provides a charge of compressed air which forces down for the balance of the working stroke the piston which has stopped at the top of the compression stroke or just beyond that point. Then, by means of a distributor, the compressed air supply is shut off from that cylinder at the end of the working stroke and forced into the

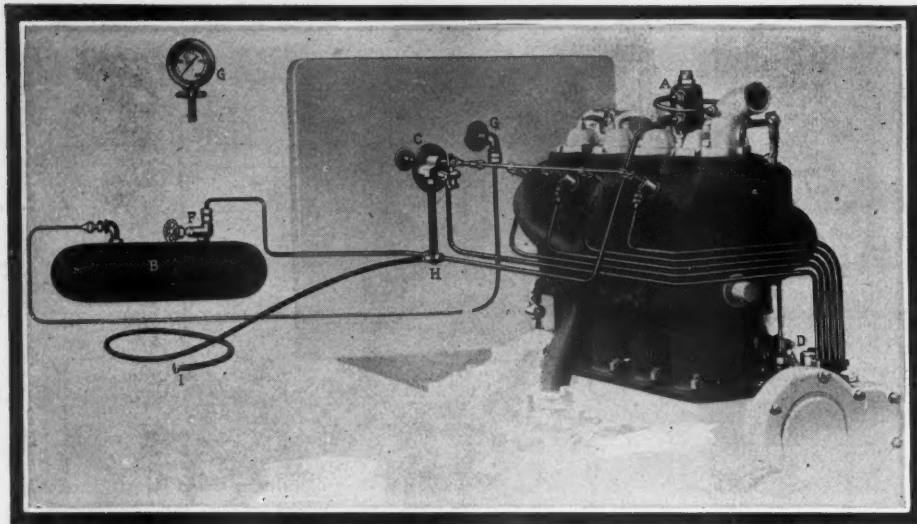


PLAN OF AMPLEX AIR STARTER

A, Distributer; B, Ports; C, Pushrod; D, Air Tank; E, Shut-off Valve; F, Air Gauge



START-LITE COMPRESSED-AIR STARTER



CHALMERS COMPRESSED-AIR STARTER

next cylinder ready for the working stroke.

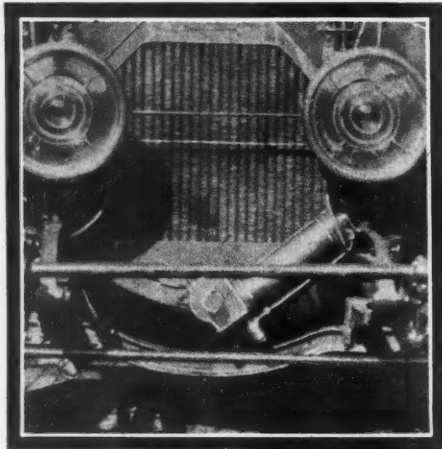
The valve which supplies the compressed air consists of a water-jacketed cast iron check valve in the head of the front cylinder. As the explosions occur in the cylinder the pressure raises the valve admitting a small quantity of the compressed gas in the cylinder to pass through and into the storage tank. This

Start-Lite—The Start-Lite air starting outfit consists of a compressor-distributor unit with an integral automatic governor, a steel storage tank, a master valve controlling the flow of air from the tank to the distributor, inlet valves—one for each cylinder, pressure gauges, a hand-operated outlet valve and the necessary tubing, connections and check valves. The compressor-distributing unit consists of a four-cylinder air compressor and selective distributor with cam-operated poppet valves connected by copper or brass tubing to the cylinder inlet valves. This distributor admits air to each cylinder in its firing order and only to the one ready for the power stroke. A tire-inflating connection is conveniently located. In connection with this the Start-Lite Co. has brought out a priming device by which gas may be directly admitted to the cylinders to render starting easier.

Crescent Air System—The particular feature of the compressed air starter of the Crescent Air System Co. is the air crank. This consists of a metal frame attached to the car just in front of the radiator. Mounted on this frame is a brass tube or cylinder bent to a half circle or crescent. In it is a curved piston rod with a piston on one end and the other end attached to an arm or crank fulcrumed on a hollow shaft through which the engine shaft operates, the hand crank being removed. On the arm or crank is a pawl designed to engage and turn a ratchet on the engine shaft. When a charge of compressed air is admitted to the tube or cylinder the piston and crank are forced over a half

circle, the pawl turning the ratchet and thus cranking the engine as if it were done by hand.

Winton—The self-cranking system em-

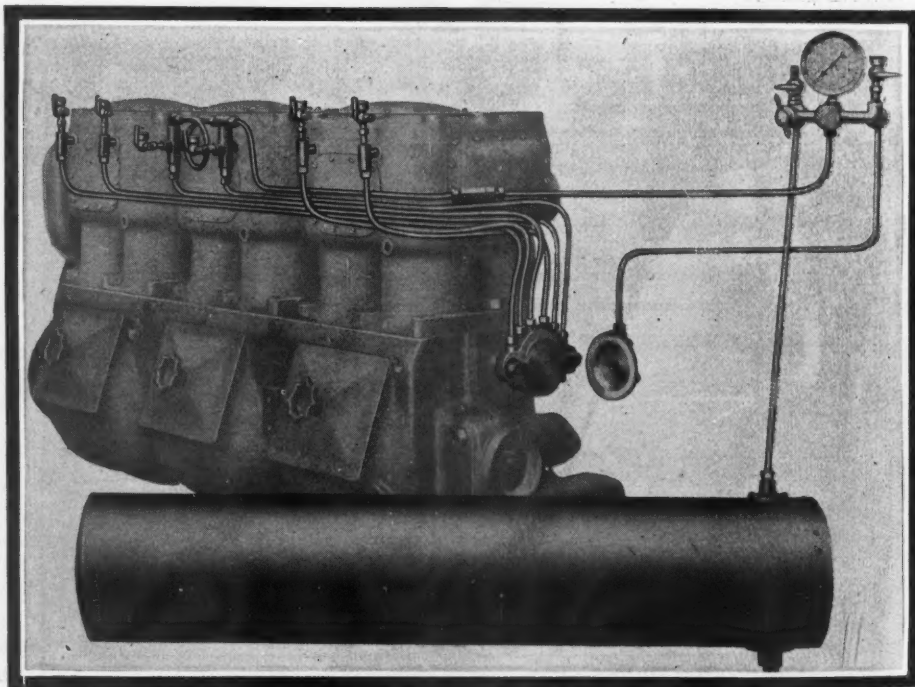


NEVER MISS AIR STARTER

ployed on the Winton six-cylinder car is of the pneumatic type, as it uses the exhaust gases of the motor, allowing them to be stored up in a tank during the exhaust stroke. Attached to the two middle cylinders of the engine are outlets through which a small portion of the exhaust gases pass to a pressure tank carried between the left frame rail and the driving shaft. The gases are forced into the tank upon the exhaust stroke of the motor, and the condensation in the tank is said to be sufficient to remove from the gas any oils or carbon particles.

Two ball valves in the pipe line between the cylinders and the tank prevent the escape of gases back to the cylinder from the tank when not wanted. The storing up of pressure in the tank is automatic, the operation stopping when the tank is full and commencing again when the pressure has been reduced below normal. Another pipe leads from the tank to a gauge and button valve on the dash and from there is led to a distributor on the camshaft of the motor. When this button is pushed the compressed gas flows through the distributor to one of the cylinders which is ready to commence the power stroke.

Amplex—Another self-starting device in which the motor is used to furnish the power for starting is that in the Amplex two-cycle car. This is in many respects similar to the Winton, but instead of using the gases in the cylinder the pressure produced by the compression stroke in the cylinder operates a small automatic air pump consisting merely of a piston which is forced upward on the compression stroke and downward by a spring. The air is pumped by this device to a tank where it is stored under pressure. From there it is led through a gauge on the dash to a distributor on the pumpshaft.

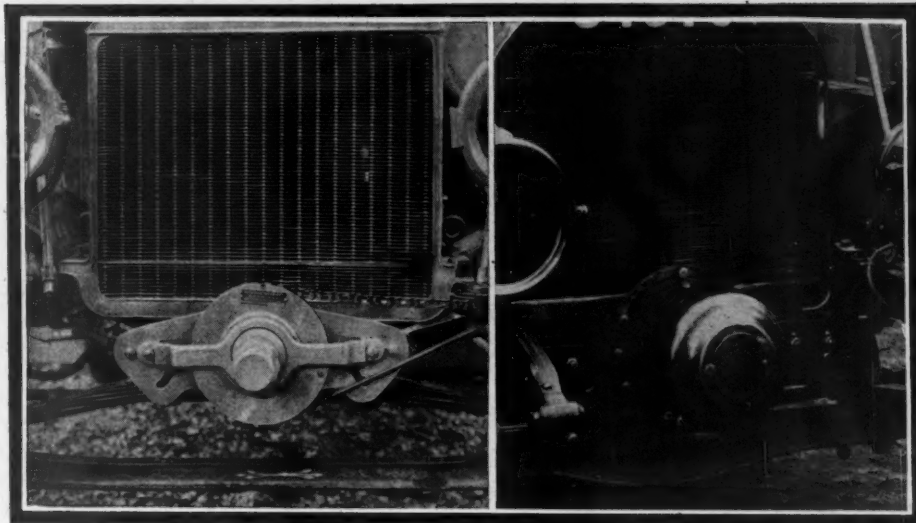


WINTON SELF-STARTING MOTOR

A pushrod on the dash opens an air inlet valve on all of the cylinders at the same time, the distributor determining the cylinder into which the air passes. A valve just in front of the driver's seat opens the pipe line to the tank and allows the air to escape when the tank has reached the proper pressure.

Never Miss—The Never Miss motor starter, made by the Wilson Motor Starter Co., is operated by compressed air, but condition. A rack on the end of the piston which is arranged to be shot rapidly forward by compressed air engages with a gear on the crankshaft. Pressing a pedal or button at the driver's seat allows the air to enter the cylinder of the starter, moving outward and turning the engine over one and one-half times. In case the motor does not take up its cycle at the first start the operation may be repeated. A small compound air pump, driven by the motor, keeps a storage tank filled with air at a pressure of 300 pounds per square inch. This is said to be sufficient to start the motor of a large car thirty-five times, or a small car forty times. Rack and gear are arranged so that in case of a back-kick no motion is communicated to the former by the unexpected impulse. The operating cylinder is located in what is probably the most accessible position, right in front of the radiator, taking the place of the starting crank.

Janney-Steinmetz—A compressed air motor starter in which air is stored under pressure by a pump and admitted to the cylinders to give the crankshaft its initial rotation is made by Janney, Steinmetz & Co., Philadelphia, Pa., and is designed in particular for use on six-cylinder motors. The outfit consists of a pump, distributor, a seamless steel air tank, an air or throt-



STAR SPRING STARTER

tle valve, cylinder valves, one for each cylinder, and an air-pressure gauge. The pump distributor unit consists of a two-cylinder pump, with a multiple-

VOLKMAR MECHANICAL STARTER

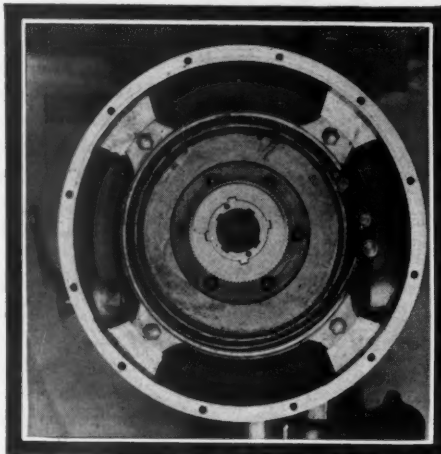
port distributor mounted thereon. The distributor rotates continuously with the motor and at camshaft speed, while the pump is thrown into and out of action as required.

The distributor consists of a cup-shaped rotator in a bronze body. The rotor runs free of frictional contact with the adjacent surfaces at all times, the pressure of the air, when applied to start the motor, being taken by a ball thrust bearing.

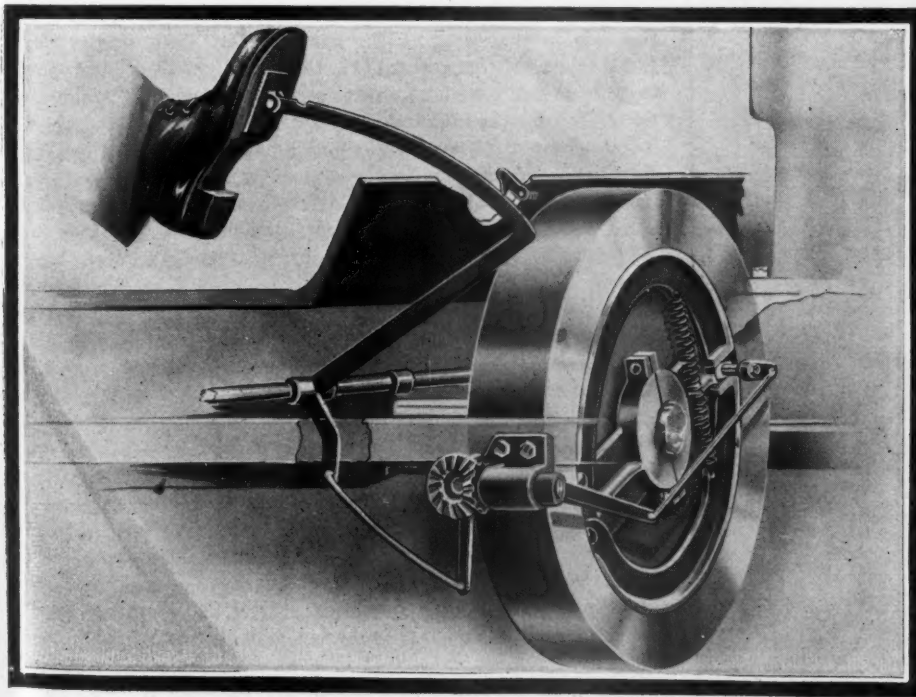
Thurber Rotary—The only case so far in which the principle of the turbine is employed in starting a motor is in the Thurber turbine rotary starter. This is a compressed air device in which a compound pressure pump located on the top of one cylinder of the motor and operated by its compression stroke stores the air in a tank. From here it is admitted to an air turbine geared to the front end of the crankshaft through a dog clutch.

Prather Pneumatic Clutch—In connection with the pneumatic clutch manufactured by the Pneumatic Clutch Motor Co. there is a self-starter feature which is only incidental to its primary object of pneumatic speed control. In this device the clutch consists of a series of pistons and cylinders which forms the flywheel and by which the power transmitted to the shaft can be varied by the pressure of air in these cylinders. The starting of the engine is accomplished by allowing compressed air from the storage tank to return to the flywheel cylinders which also form the air compressor. This spins the flywheel and turns the engine over.

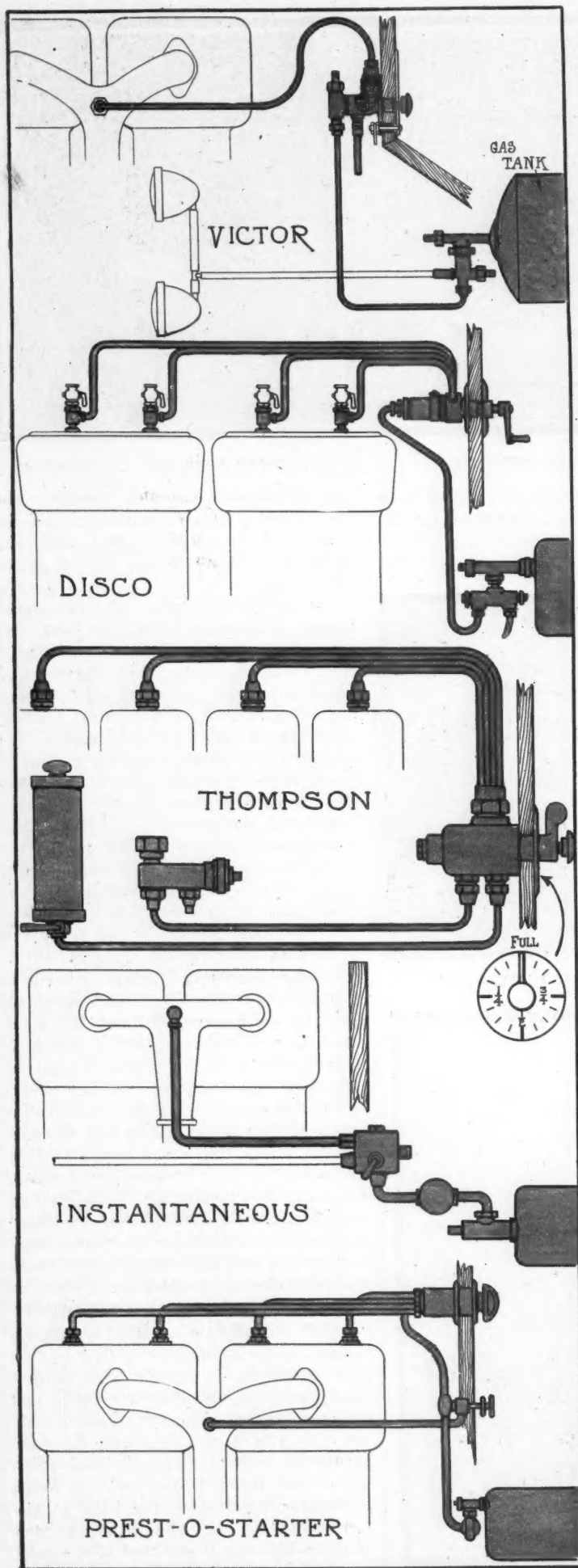
A-B-C—A unique compressed air starter is that of the Artisan Brass Co. In this the crankshaft is turned over several times by an impulse from a cylinder and piston connected to an automatic clutch. The piston is driven downward by compressed air which is admitted when starting of the motor is required. A small compressor attached to the back of the car supplies the air. The cylinder portion of the compressor is attached to the axle, while the piston is fixed to the chassis above it. Each vibration of the car forces



GARDNER STARTING CLUTCH



GLENARD PEDAL STARTER ATTACHED TO FLYWHEEL



SELF-STARTERS OPERATED BY ACETYLENE GAS

the piston down and sends the air through a check valve into a storage tank.

Midland—The starter to be employed on Midland cars is a compressed air starter of the Midland Motor Co.'s own design. The compressed air is furnished by means of a four-cylinder pump and there is an air motor located on the transmission.

SPRING AND LEVER STARTERS

Gardner—An engine-starting device which operates by the compression of a spring is manufactured by the Gardner Engine Starter Co. This arrangement consists of a drum placed next to the gearset and within it is incorporated a wound-up spring so that when released and with the transmission in direct drive the motor is started. In order to use the starter the propeller shaft is divided, one part connecting from the self-starter to the transmission and the other part extending from the former back to the differential. Between these two parts of the shaft is a clutch. One end of the spring fits over a spring in a drum, the other end has a hook by which it can be gripped by a series of teeth in the end of the shaft connecting with the differential. This company has incorporated with the starting device a special gearset in the same gear-case, which can be placed in the transmission system.

Eveready—The Eveready automatic engine starter is another automatic starter designed to be operated by foot pressure on a pedal located on the footboard of the motor car. This device is intended to be placed on the front end of the car on the starting crankshaft and resembles in appearance a reversed headlight. It consists of two powerful springs fastened to a central arbor.

Hercules—Hercules Auto Starter, Inc., is marketing a mechanical starter by which the motor is cranked from the seat through a lever and connection rods.

Elder—The Elder starter, a product of the Elder Mfg. Co., is of the spring type and does not differ greatly from the other spring devices described. The starting mechanism is in the shape of a drum with flat ends, and working parts are inclosed in an oil-tight housing so that the gears may run in oil. The drum is placed in front of the radiator or behind it and the previous running of the motor automatically winds up the spring in the drum.

Elastic Clutch—The Reagan combination elastic clutch and engine-starter consists of a cone clutch with two 12-gauge coil springs, 3 inches wide and 25 feet long, attached to an arbor on the shaft around which they are wound with the distal ends attached to the inner margin of the clutch.

Star—Another device by which the engine is cranked from the seat is that used in the Star starter. The starter proper is attached to the crankshaft, the starting crank first having been removed. A short shaft is furnished which engages with the clutch on the countershaft and the starter is lined up with it. A chain runs over a disk and passes through a pulley at the corner of the hood, where it is attached to a rod which is connected to a lever at the driver's seat. A four-way clutch fitted to the crank shaft prevents the danger of a kick.

Wilkinson—The Wilkinson motor starter, marketed by the Brown & Murray Co., is a pedal or lever device which acts directly on the flywheel of the motor, turning the flywheel over by means of a pawl when a pedal in front of the driver is depressed. The pedal is permanently attached to a cross shaft which rotates when the former is pushed. This in turn rotates a shaft extending to the flywheel.

Glenard—A starter of the pedal type which does not depend upon the tension of a spring for its operation is the Glenard starting device. An expanding clutch upon the face of the flywheel grips the latter when the pedal is pressed, turning the flywheel over three times. The motion is imparted to the clutch through a crank and bevel gears.

Volkmar—The Volkmar motor starter is operated by two powerful springs and is 8 inches in diameter and 7 inches long, finished in a brass cover. It is located on the shaft where the present starting crank is located. By pressing a pedal on the footboard the springs are released and the engine turned from

six to eight times at high speed, which is sufficient to start it.

Pull-Man—Another of the arrangements for turning the motor over from the driver's seat is called the Pull-Man motor starter, and is manufactured by A. M. Walstrom, of Minneapolis, Minn. A shoe is rigidly attached to the starting crank handle, having at one end a pin for the attachment of the strap which runs over a pulley to the driver's seat. The other side of the shoe is provided with a groove. A pull on the strap turns the motor over.

Neher—The Neher lever starter has been on the market for some time, but appears this year with some changes which improve its looks, but the principle remains the same. It is designed particularly for Ford cars. A pull on a handle at the dash engages a crank with the engine shaft automatically and turns the engine over one compression.

Kimball—The Kimball Tire Case Co., Council Bluffs, Ia., has brought out a motor starter which operates on the flywheel. The main feature is a clamp which grips the rim of the flywheel when the operator pulls upwards on the handle attached to the strap which carries the clamp.

ACETYLENE STARTERS

Disco—The principle on which the Disco starter, made by the Ignition Starter Co., operates consists of the injection of acetylene gas into each of the cylinders. A small brass tube $\frac{1}{8}$ inch in diameter is attached to a T-piece on the tank, making it possible to regulate the lighting system separately from the starting system. The gas is conducted by a brass tube to the distributing or starting valve on the dash.

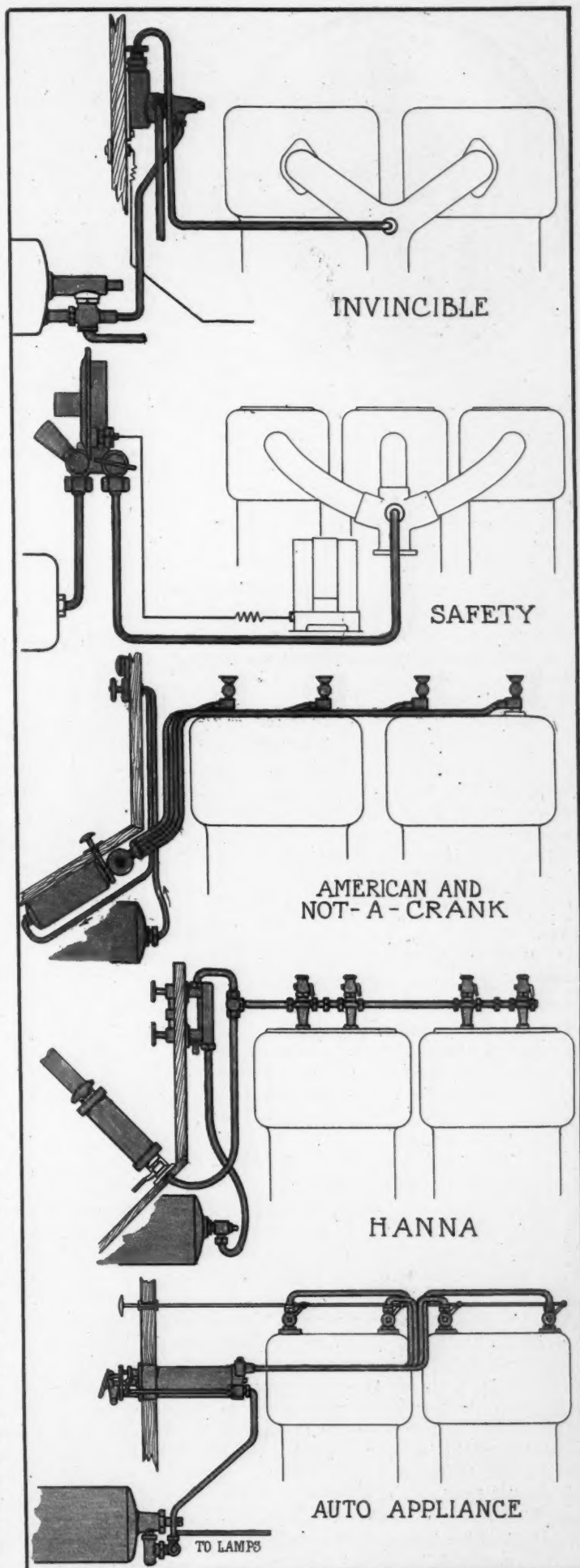
Adjustment at the valve on the tank is accomplished by adjusting a needle valve in the distributing valve on the dash. The gas enters the distributing valve from the tank and it is controlled by a taper-seated valve. In addition to the taper-seated valve there is another taper valve in the distributor which has drilled through it, and connecting with the taper seat, a hole about $\frac{1}{16}$ inch in diameter. This hole is in the same plane as four other holes on the outer and large diameter of the distributing valve and to which four $\frac{1}{8}$ -inch tubes are connected, leading to the cylinders. The priming cocks are somewhat raised on account of an extension being used, having in it a ball check, this to prevent any gases from returning to the distributing valve.

All that is necessary to start the motor is to give the crank on the dash one continuous turn. This turn of the crank lifts the small taper valve in the distributor off from its seat and allows the gas to flow through a by-pass and to another chamber in the distributor which contains the distributing valve.

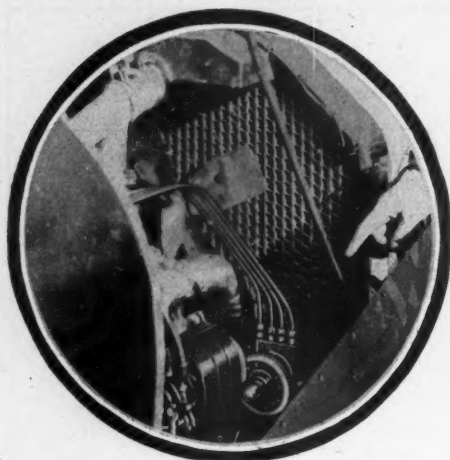
Prest-O-Starter—The Prest-O-Starter system permits the starting of the motor by the injection into each cylinder of a measured amount of Prest-O-Lite gas, which is exploded by pressing the button on the ignition switch. The driver charges the cylinders with gas by making one or two movements of the handle, which is located on the dashboard. To make the system safe under all conditions there is placed at the tank an automatic reducing valve, which reduces the pressure beyond the tank to 2 ounces. Whether the tank pressure be 150 or 250 pounds, the pressure in the lines can only be 2 ounces. On account of low pressure it is necessary that the gas be forced into the cylinders, as the cylinder compression is many times stronger than 2 ounces. This is accomplished by a pump which is placed on the dash in easy reach of the driver.

In cold weather the driver can press a by-pass valve button and cause the gas to pass from the tank directly to the intake manifold.

AA Engine Starter—The new starting device put out by the Auto Appliance Mfg. Co., of Akron, O., and known as the AA self-starter, can be applied to any make of motor having a dual ignition system. It is an internal combustion starting device that introduces by a pump a firing charge of gas and air instead of pure gas into each cylinder. This is accomplished by a revolving disk having a single porthole in the head of the pump barrel, which has the same number of portholes as the



TYPES OF ACETYLENE MOTOR-STARTERS



SURE-GO GASOLINE DISTRIBUTER

motor it is applied to has cylinders. Gas is held in check at the tank by a pressure regulator.

For use in extremely cold weather a by-pass is provided that can be opened after the motor is charged, allowing a sufficient amount of pure acetylene gas to escape into the intake manifold, where it is mixed with air that passes through carbureter and produces a mixture that will keep the motor running until a sufficient amount of gasoline can be brought up from the carbureter.

Automatic—The ignition starter of the Automatic Motor Devices Co. consists of a hollow brass shell which is the supporting medium for a whirling drum. At the end of the long shaft cut out of the same piece is a bevel gear which is geared to the motor in such a manner as to run at camshaft speed. The object of this starter is to admit gas into only such cylinders as have both intake and exhaust valves closed. Timing the admission of the gas is provided for by having slots milled out in the valves, the rest of the drum being a close fit to the outside shell and not permitting the gas to go into the cylinders, except where these countersunk holes are in opposition to the leads running to the cylinders. The object in making these holes longer than the exact circumference of the lead to the cylinder is to take care of the rocking of the motor when it stops.

Victor—In the Victor starter, manufactured by the Start-O Co., gas is led from the gas tank to the starter, which is placed on the inside of the dash with a foot button projecting through. From the starter a 5-16-inch copper tube is led to the intake manifold. Air is admitted to the starter from outside of the car. The principle is to charge the cylinders upon stopping the motor with a proper volume and mixture of acetylene gas. The only essential is that in order to start a spark must occur in the cylinder. This is accomplished by the usual start on the spark operations. Upon pushing the foot button the ignition is cut off, the main valve to the manifold is opened and the gas valve is lifted off its seat. Until the

motor slows down to the last few revolutions the flow valve prevents gas and air entering the manifold. This prevents excessive waste of gas, and due to the design of the flow valve, prevents back-firing. Air and gas are mixed in this starter and a measured volume admitted to the cylinders.

The Start-O Co. also makes the Victor plug, which can be used with any gas starting system.

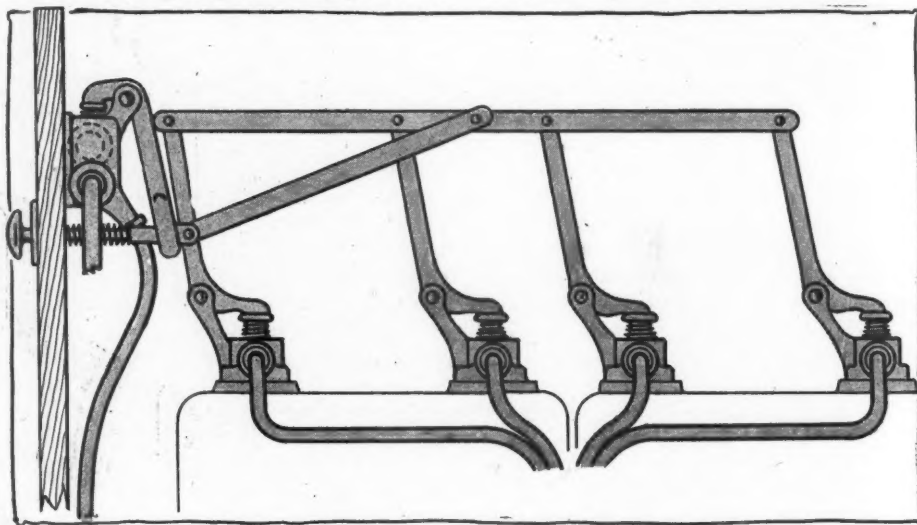
Instantaneous—The Instantaneous motor-starter is unique in that the acetylene gas is forced into the intake manifold and thence into the cylinder by means of a rubber bulb. Rubber tubing leads from the tank to the bulb, which may be placed as desired on the dash, and when the operator is ready to start the motor a squeeze on the bulb as with the ordinary bulb horn sends gas into the manifold.

Hanna—In the Hanna starter, manufactured by J. H. Valentine & Co., gas is led from the lighting tank through a tube

An individual tube leading to each cylinder insures that an equal amount of gas is supplied to each, and this in turn makes all the explosions of exactly the same power.

American—The American acetylene starter is the type in which the operating valve is connected to an auxiliary acetylene tank instead of to the main gas tank. A toe button on the footboard opens a needle valve on the auxiliary tank and admits gas to tubes leading to the ports in the cylinder head. These special ports are provided with check valves to prevent danger of an explosion in the starting system and are inserted in place of the priming cups. With the starting is combined the gas-lighting system and on the dash is located a pressure gauge and valves for controlling the flow to starter and lights. This system and the Not-A-Crank system are of the same design.

Invincible—The Invincible starter manufactured by the Invincible Starter Co.

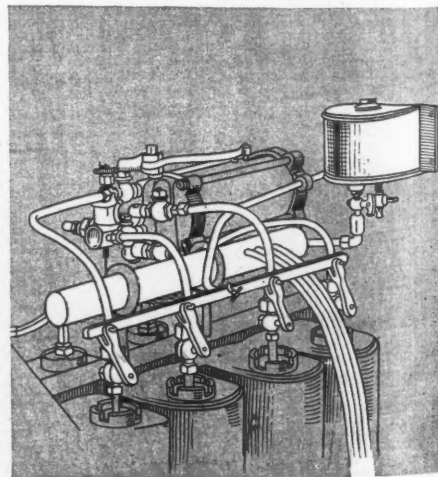


START-LITE PRIMER FOR USE WITH START-LITE AIR STARTER

to the operating valve on the dash. In connection with the operating valves there is a measuring device by which the correct proportions of acetylene gas and air is furnished. The operator fills the measuring device by means of a starter valve and the charge then is forced into the cylinders of the motor by pressing down the plunger of the measuring chamber. Pulling back the plunger fills the chamber with air and pushing it down again sends a quantity of free air into the cylinders, where it stirs up and mixes with the acetylene. The feature of this device is that only pure air is carried in the starter tubes and the injectors.

Not-A-Crank—In the Not-A-Crank starter the gas is carried from a tank to a valve in a 1/4-inch tube. This valve, located in the dash, is regulated by two small valves within easy reach of the driver. Next the gas is carried to a small compression tank under the footboard. This is fitted with a small pushrod, operated by the foot, which distributes the gas to each of the cylinders.

is of the conventional type in which the gas is led from the tank through a two-way valve to a starting valve on the dash and thence to a port in the intake manifold. The motor is primed for each start during the preceding running of the mo-



McINTYRE GASOLINE STARTER

tor, the last few revolutions being used to suck acetylene gas into the cylinder. The feature of this starter is its simplicity, as the only alteration required on the car is drilling a $\frac{1}{2}$ -inch hole in the intake manifold and a 1-inch hole through the dash for reception of the push button.

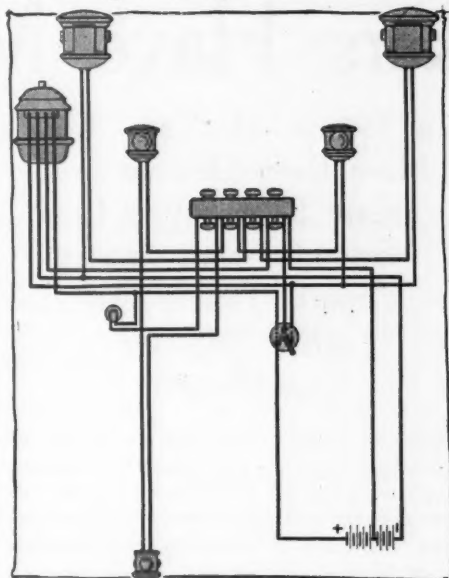
Dual—The Dual starter, a product of the Automatic Starter and Lighter Co., is designed to prime an engine with acetylene gas from the storage tank through the intake manifold, so that the driver can start on the spark at any time. The priming is done by taking the right amount of acetylene gas and air into the cylinders through the manifold before the engine is stopped. The system simultaneously stops the engine and primes it for the next start by a one-quarter turn of a small lever on the dash. Turning the lever in the opposite direction lights the gas lamps.

E-Z—The Auto Starter Co. manufactures under the name of the E-Z starter an acetylene engine-priming device which is operated by a foot-push button. The push button operates a small plunger pump by which the gas is forced into each cylinder head. The cylinder connections by which the gas is directed into the combustion chamber replace the priming cups.

Thompson—The Thompson self-starter is of the acetylene gas type, the principle of which is to inject a measured amount of gas into the cylinders to form the proper explosive mixture and to ignite it by the spark in the regular way. It is operated by one small push-button valve with a very simple but efficient adjustable stop, which regulates the amount of opening of the valve in proportion to the amount of pressure in the gas tank. For instance, at high pressure the valve is only allowed to open slightly, and at very low pressure it is allowed to open wide, thereby injecting exactly the same amount of gas into the cylinders at high and low pressure and insuring the proper amount of gas under all conditions.

Meteor—In the Meteor engine-starter a two-way valve is attached to any make of

acetylene gas tank. One valve opens to the headlights, the other feed pipe leads directly into the distributing valve attached to the dashboard. From the distributing valve pipes lead to each priming cup on each cylinder, the original priming cups on the motor being replaced by a simple check valve, on which the priming cup is placed. Another pipe leads from the distributing valve to a connection made by boring a small hole in the intake manifold. When ready to start the handle on the distributing valve is turned once, thus causing a charge of gas to be put in each cylinder; also in the intake manifold. For use with its self-starter and others of the ignition type, the Meteor Auto Tank Co. has brought out a special vibrating coil designed particularly for service with acetylene gas. It should be particularly useful in cars which



NORTH EAST ELECTRIC SYSTEM

use a low-tension magneto with a non-vibrating coil, or cars which employ a high-tension magneto only.

Safety—The G. & S. Accessory Co., of 250 West Forty-fifth street, New York city, has recently brought out the Safety starter. This is attached to the dash or footboard and connected to an acetylene tank from which the gas is conveyed through the instrument to the intake manifold on the motor where it is distributed to the cylinders. This is made possible by the use of a diaphragm housed in the upper chamber so that when the car is stopped through the starter by short-circuiting the magneto the suction caused by the last few dying revolutions of the motor pulls the diaphragm over, opening the gas valve to allow a charge of gas to be drawn into the motor. When the motor stops this suction ceases and the diaphragm flies back cutting off the gas automatically. There are three separate valves for shutting off gas between the starter and the gas tank, and an atmosphere port which is always open, except when the gas valves are open for the admission of gas



SURE-GO GASOLINE MIXER

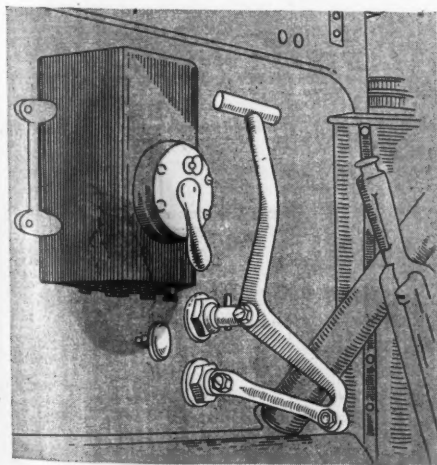
to the motor, allowing the gases to leak out into the open air.

GASOLINE ENGINE-STARTERS

McIntyre—The starter employed on the McIntyre cars is a gasoline starter of McIntyre design. This is worked on the principle of a pump, the handle being on inside of dash. Working the handle four times shoots a charge into each cylinder, the charge being of gasoline and air which is mixed by a mixing valve attached to starter. Gas machine gasoline, which is very explosive, is used. Distribution of the charge is effected by a ratchet operated selector which changes the charge so it goes into a different cylinder each time. Pulling a small lever opens pet cocks to the cylinders and four strokes on the pump forces an explosive charge into all cylinders.

Sure-Go—Another gasoline starter is the Sure-Go, a product of the Motor Starting Co. In this arrangement carbureted air is forced into the cylinder and ignited. A small air hand-pump is fastened to the floor of the car, near the driver's seat, and to the pump is attached a small carbureter, the whole being not more than 6 inches long and about 1 inch in diameter. From the pump lead four small tubes to the cylinders of the engine. Two strokes of the pump sends a mixture of gasoline and air into the cylinder heads.

Page—The Page starter, made by the H. and D. Mfg. Co., is a gasoline starter. The principal parts of the design consist of a metal case which is mounted in any available space under the hood. Copper tubes run from the case to the pet cock of each cylinder. A rod connects the case to a small thumb lever mounted on the dash. The lever has three positions, closed, 1 and 2. The position closed is where the lever rests normally, both when the engine is at rest and after it has been started. In starting the lever is allowed to rest at 1 for a few seconds, when it is moved to the position marked 2, this position being midway between 1 and closed. Allowing it to remain a few seconds on 2, the lever is then moved to position closed, the engine starting at the end of this action.



McINTYRE GASOLINE PUMP

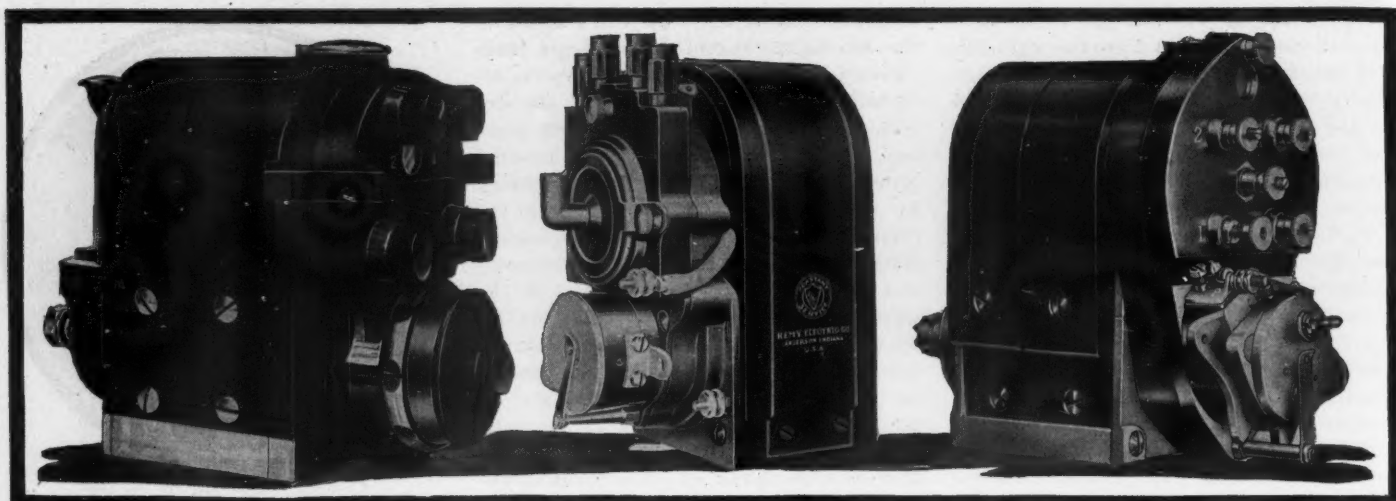


FIG. 1—THE NEW WATERPROOF BOSCH

FIG. 2—THE REMY MAGNETO

FIG. 3—EISEMANN HIGH-TENSION MAGNETO

Magneto Makers Have Made Progress

AN INSPECTION of nearly twenty makes of ignition magnetos which are on the market in this country at the present time reveals several marked tendencies in the trend of magneto design and construction.

Several magneto manufacturers have devised a means of increasing the sparking efficiency of their products at low engine speeds. A number have brought out mechanisms for attachment to their apparatus which advance and retard the spark automatically as the speed of the motor increases or decreases, so that spark control requires no attention from the operator of the motor while it is in operation. Most of the prominent makes have been rendered thoroughly water and dustproof. There has been a slight advance toward the placing of individual transformer coils near the spark plugs in order to reduce the transmission of high-tension currents. And a wave of general improvement and refinement in workmanship and details of construction has washed out many of the trouble-making features of the various mechanisms, which will result in additional durability, efficiency and accessibility.

Before describing the changes and improvements to be found in the 1912 mag-

In Course of Year Means Have Been Devised to Increase Efficiency at Low Speeds—Automatic Spark Timing Another Improvement Feature

netos, it might be well for the benefit of those not familiar with these mechanisms, to divide them into classes according to the fundamental principles of their designs and constructions. All ignition systems in which the ignition spark jumps between two stationary points of a spark plug, are jump-spark systems; and in all jump-spark systems a high-tension current is required. A magneto is a mechanism which converts the electricity obtained from a permanent magnet, or set of magnets, into electric currents, or current electricity. There are two kinds of electric currents used in all jump-spark ignition systems, primary, low-pressure or low-tension currents, and secondary, high-pressure or high-tension currents.

Ignition magnetos may be classified in

two groups, according to the basic principles employed to generate the initial electrical currents. These classes are known as the armature type and the inductor type. In the armature type of magneto, electric current is generated by revolving several thousand feet of fine copper wire which is wound around a soft-iron core, between the pole pieces of the magnets. The armature type machines may be further divided into two classes: One, called the primary armature magneto, and the other the compound armature magneto.

The primary armature machine has but a single winding in the magnetic field, the space between the pole pieces which is constantly saturated with electricity, and it generates a primary low-tension current. It requires an outside transformer coil to step-up or produce the high-tension or secondary current required at the spark plugs.

The compound armature type incorporates a second, or secondary, winding which is wound around the primary winding; this type of machine generates a high-tension current without the aid of an outside transformer or step-up coil, and is generally known as a strictly high-tension magneto.

In the inductor type of magneto there are no revolving windings. There is a re-

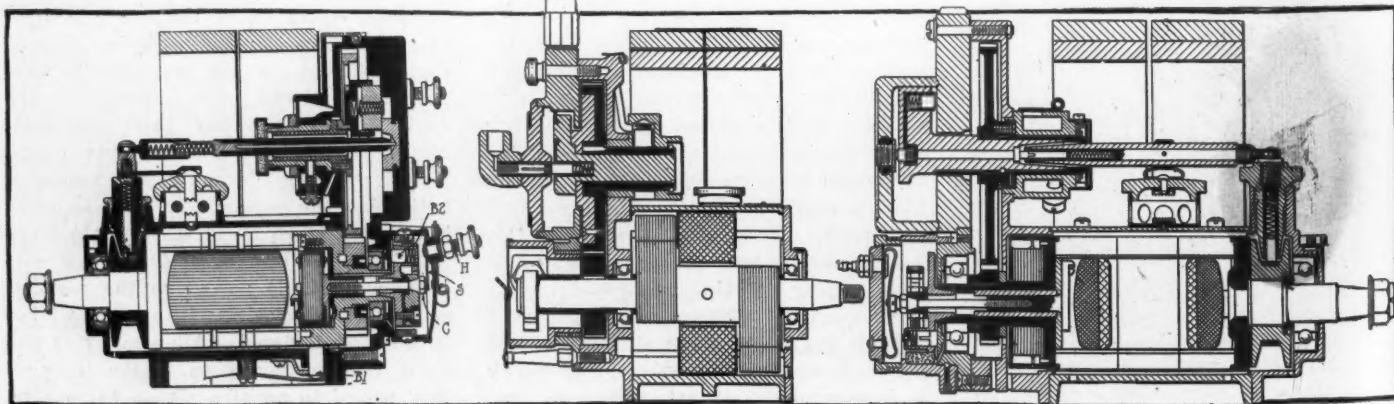


FIG. 4—SECTION OF BOSCH MAGNETO

FIG. 5—DETAILS OF REMY

FIG. 6—SECTION OF EISEMANN MAGNETO

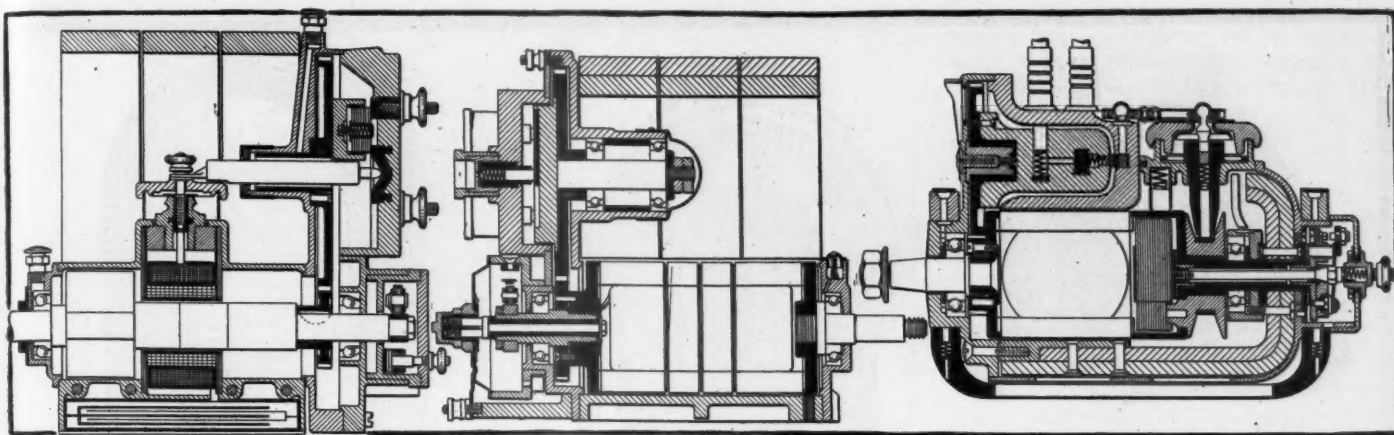


FIG. 7—SHOWING DETAILS OF K-W

FIG. 8—SPLITDORF LOW-TENSION

FIG. 9—MEA HIGH-TENSION MAGNETO

volving armature, rotor or inductor shaft, but the windings are stationary. The object of this design is to reduce the number of moving wires, sliding or wipe contacts, brushes, collector rings, etc., and thereby simplify the construction. As in the armature type, however, this type either is high-tension or low-tension, according to the ability of the apparatus to produce a high-tension current without the aid of an outside auxiliary transformer coil.

Bosch—Bosch high-tension magnetos are of the compound armature type and require no auxiliary dash coils, except in the dual systems in which a small battery coil is used, which is of special design, and embodies several unique features, such as a lock and key and an efficient starting button. The features of the Bosch line of magnetos for 1912 are the model ZR4, Figs. 1 and 4, a new enclosed water and dust-proof design, for motorcars and motorcycles, which is an outgrowth of the DR and D types; and the incorporation in all new apparatus of the overlap pole shoes whose inductor effect greatly increases the efficiency of the spark at low speeds.

The method of inclosing the magneto is worked out with considerable ingenuity and the smallest details have been given careful consideration. The end plates, as may be noticed in the illustration, fit snugly to the magnets, an absolutely tight joint being insured and maintained by the insertion of a special felt packing. The

joint between the magnets is treated in a like manner, which renders impossible the entrance of any foreign substance whatever. The entire surface of the magnets is ground to a smooth and even finish; and oil cups have tight-fitting, overhanging covers.

Among the refinements and improvements to be found in the new machines, the advance lever can readily be removed and put on at almost any angle desired; Fig. 13, a new and simple design of spring cover, is fitted to the circuit-breaker box; there is a window at the top of the distributor through which the distributor gear may be seen, and a marked tooth upon it shows when the armature is leaving the point of maximum induction; another window is provided on the front of the distributor, and when a number, 1, on the distributor segment may be seen through it one may know that it is set for firing No. 1 cylinder of the motor.

The effect of producing an intense ignition spark at low speeds, is secured by extending the pole shoes and forming them into broad teeth, as indicated in Fig. 13. Instruments with these extended pole shoes, will deliver an ignition spark at as low a speed in the full retard position as in the full advance, which greatly facilitates starting, and permits steady and regular operation at very low engine speeds. A further result of this construction is in the practical elimination of the

repelling action of the armature as it cuts the maximum of magnetic lines; the rotation of the armature, therefore, is more uniform and gear noises are reduced to a minimum.

Bosch ignition products include a most comprehensive line of well-known magnetos, spark plugs, battery ignition systems, combination magneto and battery systems, etc., for all sizes and types of internal combustion motors.

Remy—In addition to the combination lighting and ignition outfit brought out during the year 1911, the Remy Electric Co. enters the field for 1912 with six types of ignition magnetos, four of which are a development of the well-known inductor type, but redesigned throughout and so refined and improved as to bear but slight apparent resemblance to the old design.

The four new models are designated RD, RF, RE and RG. All are of the inductor principle characteristic of Remy design, but they differ in the following respects: The RD is intended for a dual ignition system, is comparatively small, and has but two sets of magnets. It weighs only 20½ pounds; is 7¼ inches high; 7¼ inches in length, and 4¾ inches wide over all. Model RF is identical to the RD except that it is larger and heavier and has three sets of magnets. Models RE and RG respectively are similar to RD and RF, except that they have double

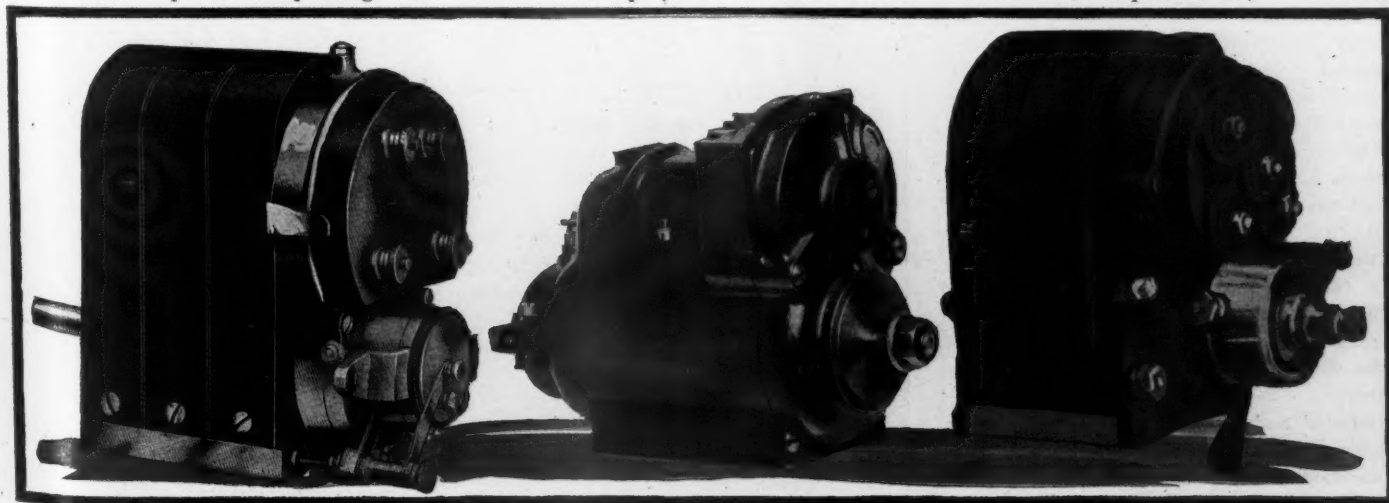


FIG. 10—THE K-W HIGH-TENSION

FIG. 11—THE WATER-PROOF MEA

FIG. 12—NEW SPLITDORF LOW-TENSION

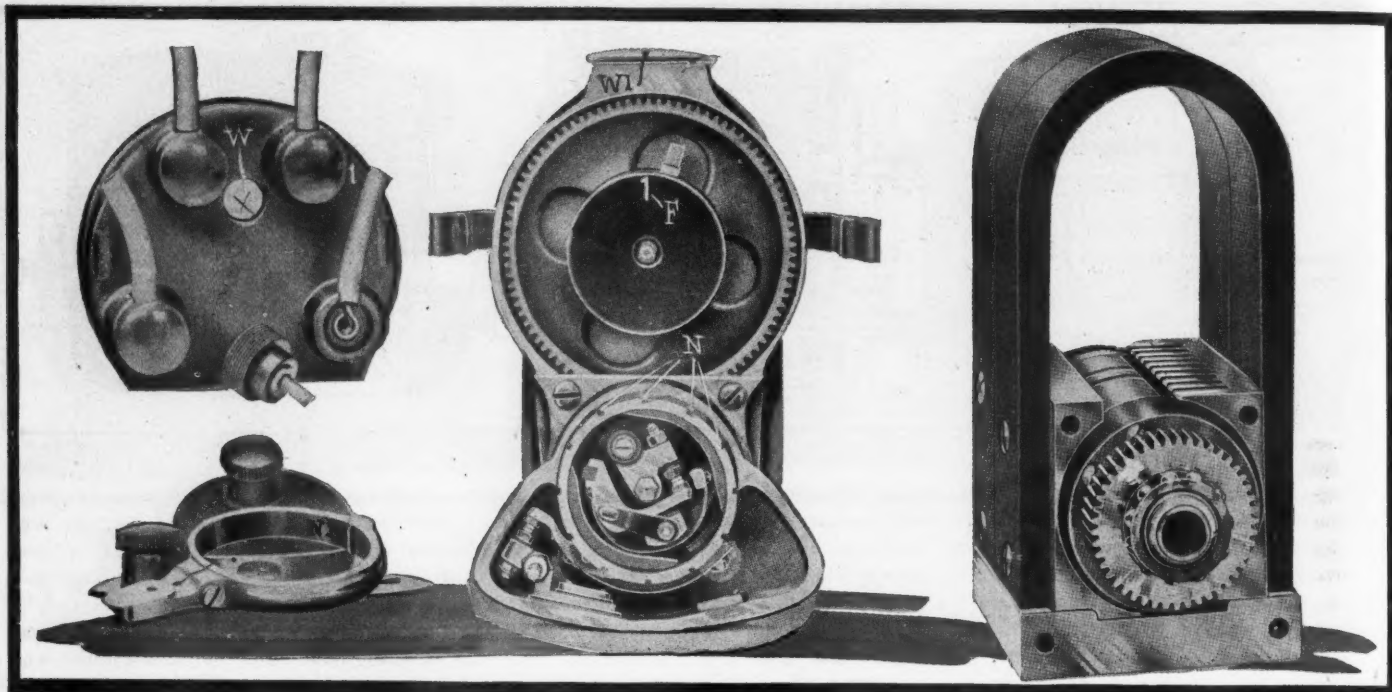


FIG. 13—THE NEW BOSCH MAGNETO WITH DISTRIBUTER AND CIRCUIT-BREAKER COVERS REMOVED. THE NEW EXTENDED POLE SHOE IS SHOWN IN THE ILLUSTRATION AT THE RIGHT

To facilitate timing the figure F on the distributor segment may be seen through the window W in the cover; by raising the lid W1 a window at the top is exposed through which a marked gear tooth is visible. The lug N1 on the ring of the timing lever may be fitted to any of the slots N, so as to be arranged at any angle desired

distributors for two-point ignition systems. Models YA and UA are automatic friction driven direct current generators, one for jump-spark and one for make-and-break ignition.

As for the improvements to be found in the new Remy magneto, Fig. 2, the distributor is made of bakelite, instead of rubber, a new composition which is claimed to be more durable, a better insulator and having better heat and weather resisting qualities. The gears now are on the same end of the machine as the distributor and have finer teeth; the gear on the inductor shaft is of steel and the one on the distributor shaft is of bronze and fiber; the shafts are of steel, ground to size, and the gears are keyed and fitted to tapers; thus wear and consequent backlash are reduced to a minimum.

To render the apparatus water and dust-proof, all joints are provided with felt washers. A new improved design of terminal is used. The distributor cover is secured by a spring yoke that renders it readily removable. Magnets are held down by a neat nameplate of sheet steel, and they are ground and carefully fitted to the pole pieces to avoid magnetic losses. The stationary primary winding in the magneto is redesigned and more efficient, and the windings of the dash transformer coil used in connection with the magneto also are redesigned and improved. The switch on the coil box is redesigned and now has a neat metal cover having a sand-blasted finish; and it is provided with a locking key, and push-button for starting on the spark. Straps of metal are provided for attachment of

the coil box to the dashboard of car.

The model RF magneto which has three sets of magnets and all of the above mentioned improvements is particularly adapted for heavy-duty work, such as required on trucks and tractors. The double distributor models also are the same except that the extra distributor is attached to the rear end of the machine.

Splitdorf—The principles upon which the most widely used Splitdorf magnetos are built have been characteristic of Splitdorf design for many years, and are so well known as to require little description. There is but one primary winding on the revolving armature, Fig. 8, and a transformer dash coil is used to generate the high-tension currents which are re-

turned to the distributor of the magneto and then distributed to the spark plugs of the motor.

The Splitdorf line for 1912 includes two new motor car magneto models, and also two high-tension motorcycle machines having compound armature windings. In addition to these are a magneto for lighting and one for combination lighting and ignition. The two new motor car magnetos are of the primary armature type, but the line also includes a compound armature type brought out last year. It is a radical departure from Splitdorf practice, brought out only to supply a demand for that type of apparatus. In the other two new models, however, the well-known Splitdorf principles are rigidly main-

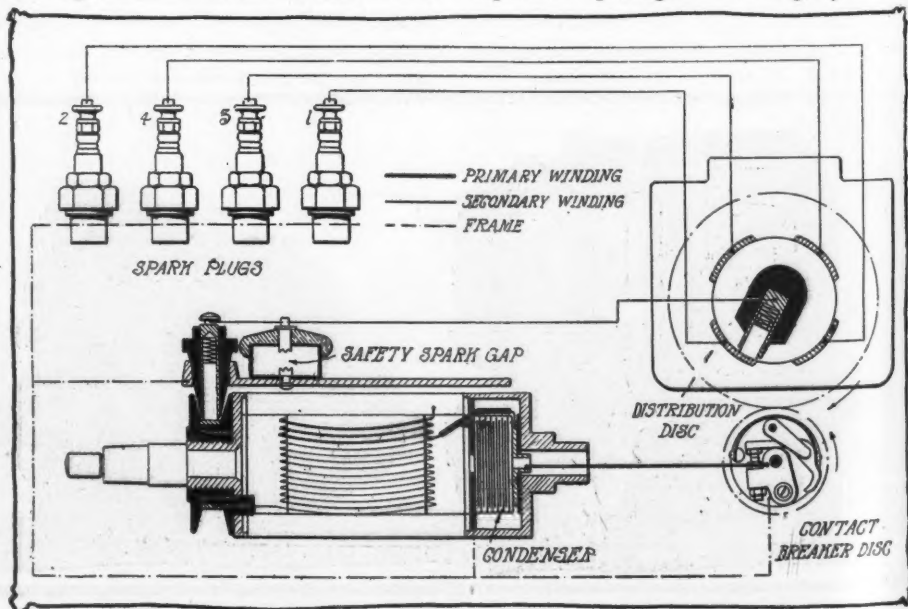


FIG. 14—WIRING DIAGRAM OF A BOSCH HIGH-TENSION SYSTEM

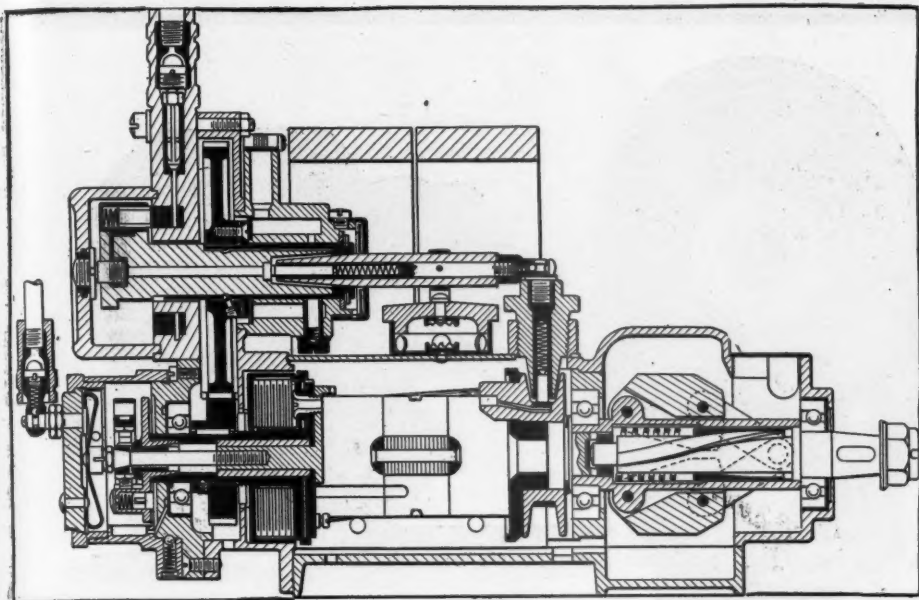


FIG. 15—NEW EISEMANN MAGNETO WITH AUTOMATIC TIMING DEVICE

tained, and they simply are a development of the 1911 models T and F.

These new models are designated X and O. Practically the only difference between the new model X and the F of 1911 is that the X has its ground brush removed from the front and located at the top of the rear end of the armature casing; the cover spring on the circuit-breaker box is removed from below and pivoted in a more convenient manner to a spindle at the side, and the distributor is now screwed on instead of secured by blade springs and a notched pin. The Model O magneto, Fig. 12, differs from the F only in that the cover spring of the circuit-breaker box is more conveniently arranged, as above described, and new distributor terminals of the double nut type replace the more bulky cup design. A notable change in the coil provided for use in connection with both these mag-

netos is that it is contained in a substantial box which is designed to occupy a position in front of the dash under the hood, Fig. 33, whilst the switch upon it pierces and is flush with the exposed side of the dash. The switches now are of metal instead of rubber.

Eisemann—An automatic centrifugal spark advance mechanism, Fig. 15; a new design of pole piece, Fig. 16, that increases the sparking efficiency at low engine speeds; and a few minor improvements or refinements that add to the general efficiency of the product, are the new features to be found in the Eisemann magnetos.

Eisemann high-tension magnetos are of the compound armature type, in which both the primary and secondary windings are on the revolving armature of the magneto, hence they are complete in themselves and require no auxiliary dash coils

except in the dual system in which a small compact dash coil is provided for transforming the battery current into high-tension. This coil is designed to pierce the dash and is combined with the switch which remains flush with the exposed side of the dash. The switch has a button for starting the motor on the spark, and the switch handle is removable when in the off position, thereby serving as a key to prevent unauthorized use of the car.

As for the details of the method by which the automatic timing is obtained, a cage is mounted on an extension of the armature shaft, Fig. 15, and a rectangular block slides in this cage. This block is drilled and threaded for the reception of a helically-cut shaft. The shaft is the driving shaft, which is attached to the gearing. It has a thick double thread which is square cut and the block slides up and down on this threaded shaft. Centrifugal governor balls are attached to the blocks by means of links; the balls fly outward when the shaft is revolved, and the action of the links causes the block to slide in the cage.

In so sliding it travels along the threaded shaft and as a result the block is slightly rotated. The drive of the magneto is applied through the shaft, which, therefore, is unyielding, and as the block rotates it carries with it the cage in which it works and the armature shaft to which the cage is fixed. The armature is thus advanced and likewise the contact-breaker, which is attached to the other end of the armature shaft. When the speed drops, the reverse motion takes place, assisted by the action of a spring against which the governor works at all times. By means of this device automatic advance may be obtained from 18 to 57 degrees.

As for the improved pole-shoe design

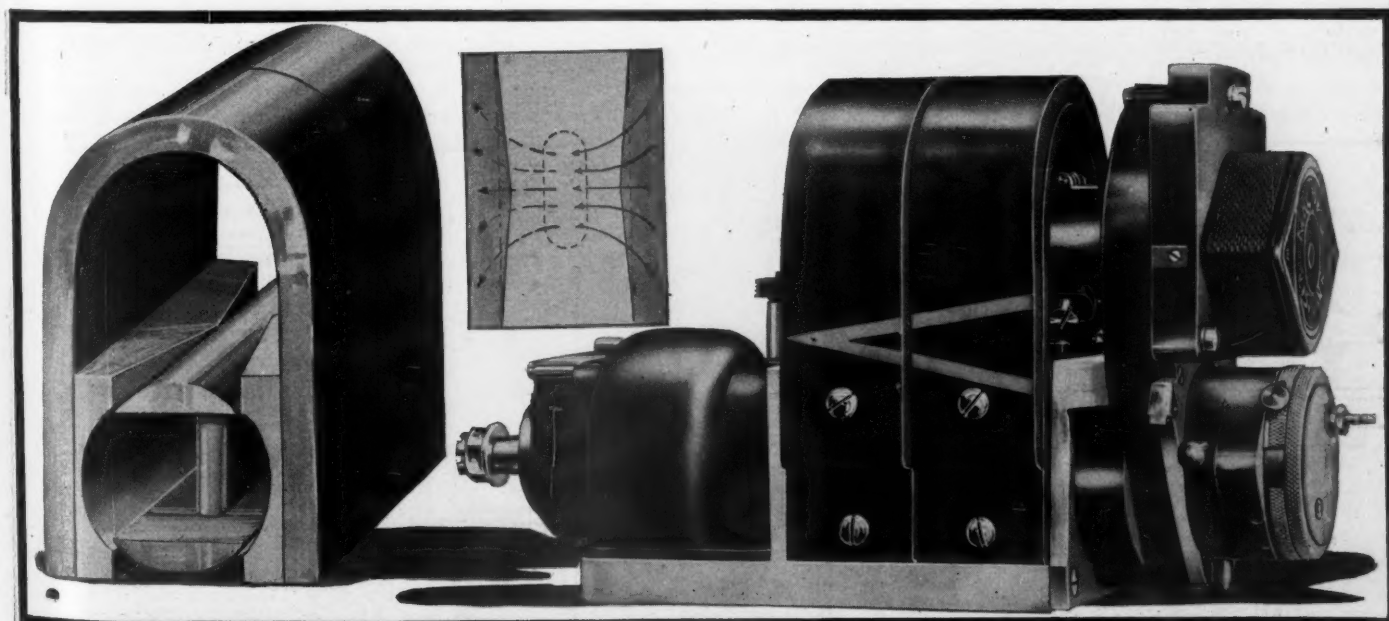


FIG. 16—THE NEW EISEMANN POLE SHOE DESIGN AT THE LEFT; A PLAN VIEW ABOVE IN THE CENTER WITH ARROWS SHOWING CONCENTRATION OF MAGNETIC LINES OF FORCE THROUGH THE CORE OF THE ARMATURE WINDING INDICATED BY DOTTED LINES. EXTERNAL VIEW OF MAGNETO WITH AUTOMATIC TIMING DEVICE, AT THE RIGHT

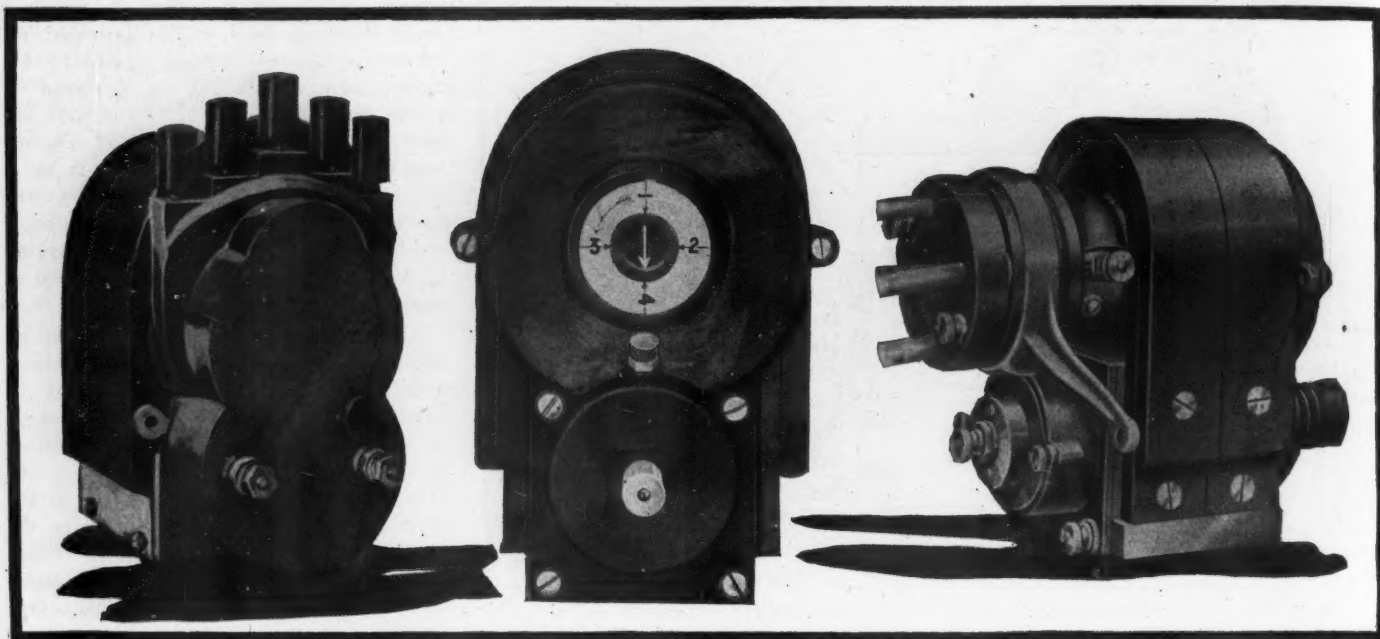


FIG. 17—NEW BRIGGS MAGNETO

FIG. 18—REAR END OF NATIONAL

FIG. 19—SIDE VIEW OF NATIONAL MAGNETO

the top and bottom extensions of the pole pieces, or shoes, instead of being straight or parallel, now converge toward each other from either end so that they are closer together near the center, thereby concentrating the strength of the field toward the central portion of the armature winding. The result of this is that whereas with the old pole shoes it was necessary to obtain at least 105 to 120 revolutions per minute before obtaining an ignition spark, the spark now is obtained at 65 revolutions per minute, and it has the same size and volume through an advance and retard range of 90 degrees.

K-W—Though the K-W Ignition Co. is not bringing out any new models of magnetos for 1912, the company has added several improvements that have suggested themselves from time to time during the past year. The K-W line comprises quite a variety of high and low tension magnetos, for ignition and lighting purposes, and also a number of spark coil designs, of which the K-W master vibrator is a fea-

ture many advantages being claimed for it.

The characteristic feature of the K-W magnetos is that they are of the inductor type in which there are no moving windings. The principle used in the K-W and that of the Remy are very similar in that both have windings concentric with the rotor shaft, and mounted between the halves of the rotor. In the K-W, however, Fig. 7, each half of the rotor has two wings and the halves are at right angles to each other so that an induction wave is produced at each quarter revolution of the rotor shaft; while in the Remy there are but two oppositely disposed wings which produce an induction wave at each half revolution of the rotor shaft.

There are three types of high-tension K-W magnetos which are designated models J, H and HT. Model J, Figs. 10 and 7, is a very small, compact design of conventional and neat external appearance and is designed for motors of 30 horse-power and under. Its characteristic difference lies in its size, and in that it has three single

magnets of rectangular section mounted very closely together. Model H is designed for motors of 40 horse-power and under, and it has four heavy magnets of square section. The model HT is the largest, being adaptable to the largest engine made, and it has five heavy magnets of square section.

The K-W high-tension magnetos have double windings, that is they have a primary or low-tension winding, which is surrounded by a secondary or high-tension winding. The current generated in the primary winding goes through the circuit-breaker, where its current is interrupted. At the moment of interruption of current in the primary winding a powerful surge of current is generated in the secondary winding. This goes to the center of the high-tension distributor brush and from there is distributed to the various cylinders of the motor. Like most high-tension machines, it includes a condenser, which is bridged across the circuit-breaker points. Its function is to absorb the low

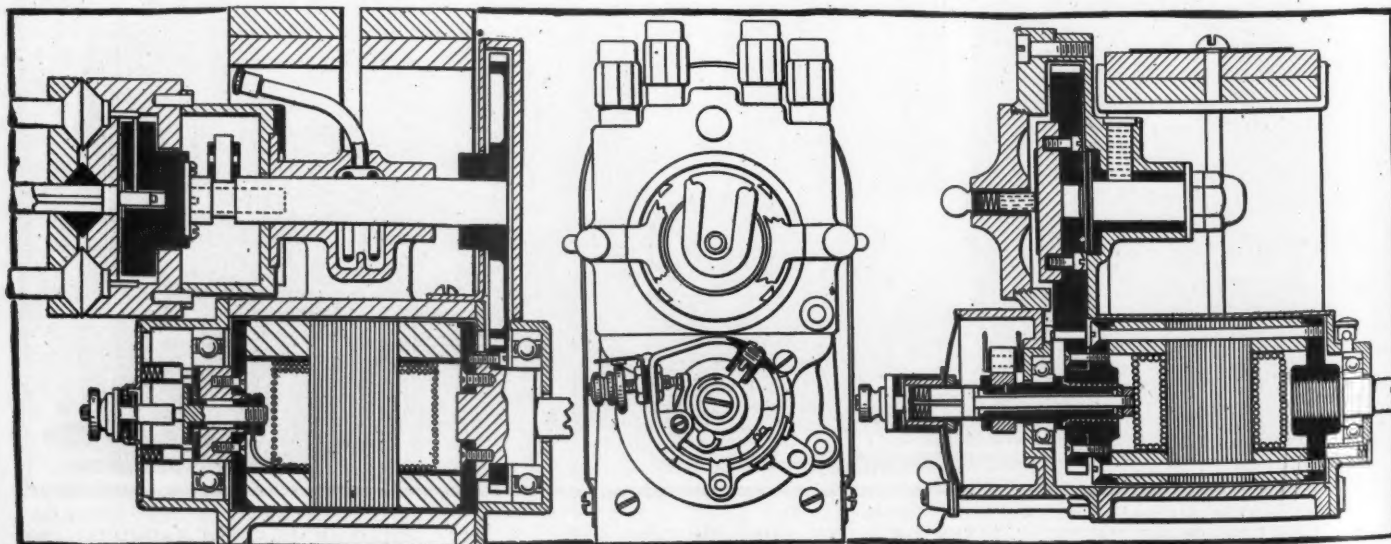


FIG. 20—SECTION OF NATIONAL

FIG. 21—END OF REMY

FIG. 22—THE MICHIGAN MAGNETO

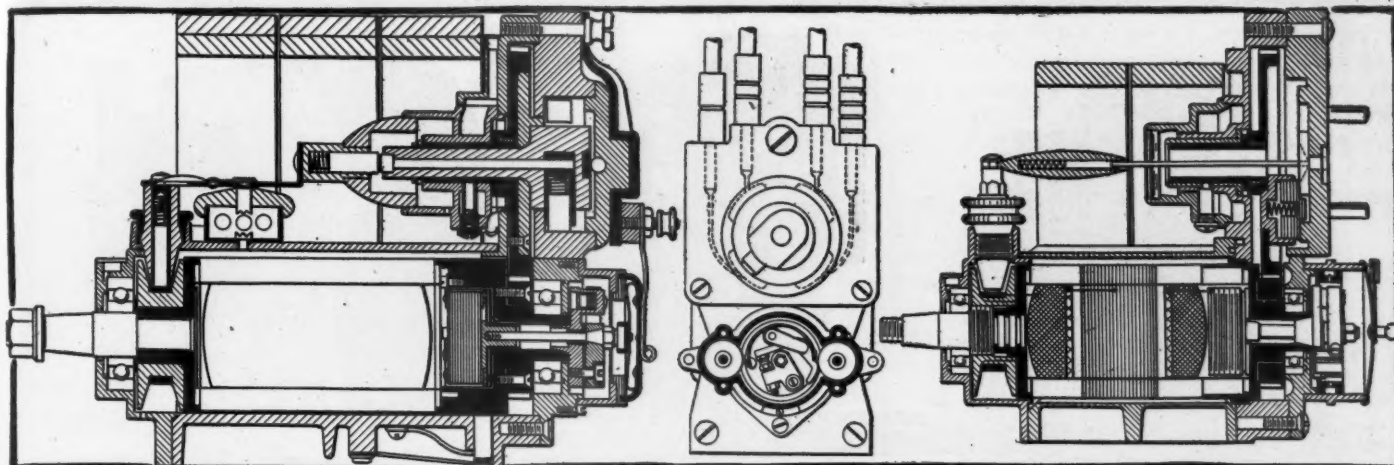


FIG. 23—SECTION AND END VIEW OF LARGE BOSCH HIGH-TENSION MAGNETO

FIG. 24—SIMMS HIGH-TENSION MAGNETO

tension spark at the circuit-breaker points, caused by the breaking of the primary circuit. It is made of a large number of sheets of tinfoil and mica.

Mea—A new water and dust proof magneto, Fig. 11, is a feature of the line of Mea magnetos that Marburg Brothers are handling for the season of 1912. It is built along the lines of the model A-4 of 1911, which has a stationary housing with the magnets turning on the inside of the housing. It differs only in that the high-tension connection from the carbon holder to the distributor is under a light metal cover to which the distributor is secured. Two cap screws secure this cover to the body of the magneto housing.

Mea magnetos are made in a complete variety of types and sizes so as to be adaptable to all makes of internal combustion motors. They are of a strictly high-tension compound armature type; and the characteristic feature of their design is that the magnets are bell-shaped and placed horizontally, therefore unlike the customary horse-shoe types, mounted vertically. This construction makes practicable the simultaneous advance and retard of mag-

nets and timer, so that the spark always is generated in the strongest part of the field. When the magnets and timer are shifted together the heat value of the spark is the same in the advance and retard positions and the range of timing is limited only by the amount the motor can stand; it varies from 45 to 70 degrees and more with different types.

Besides the features described above, there are many details of Mea construction well worthy of note. The magneto proper, Fig. 9, is mounted in a cradle, which is bolted to the motor frame or base and remains undisturbed when the magneto is dismounted. Resetting or retiming of the magneto is made extremely easy by means of a small indicator or window on the front of the distributor, where it may be readily seen. This is designed to make it absolutely fool-proof, and shows the number of the cylinder which the magneto is ready to fire.

As for the operation of the Mea magneto, the I-shaped armature carries a low-tension primary and a high-tension secondary winding connected in series. The low-tension winding is ordinarily short-

circuited by a breaker or timer which opens at certain points of each revolution, with the result that a high voltage is generated in the high-tension winding at the moment of the break; thus a spark is produced across the gap in the cylinder to which it is connected; connection with the spark plugs of the different cylinders being made in the proper firing order by the revolving segment of the high-tension distributor.

Other commendable features of Mea design and construction are: Lightness, simplicity, accessibility, compactness and thorough protection from dust and water.

Simms—The Simms magnetos, Figs. 26 and 24, are of the true high-tension compound armature type, with both a primary and secondary winding upon the armature, and the new 1912 Simms magnetos, which to all outward appearance is the same as the 1911 style, will give just as good a spark with the advance lever fully retarded as with it in the the fully advanced position. This improved sparking efficiency at low engine speeds has been brought about by the adoption of a new design of pole shoe, which provides two separate

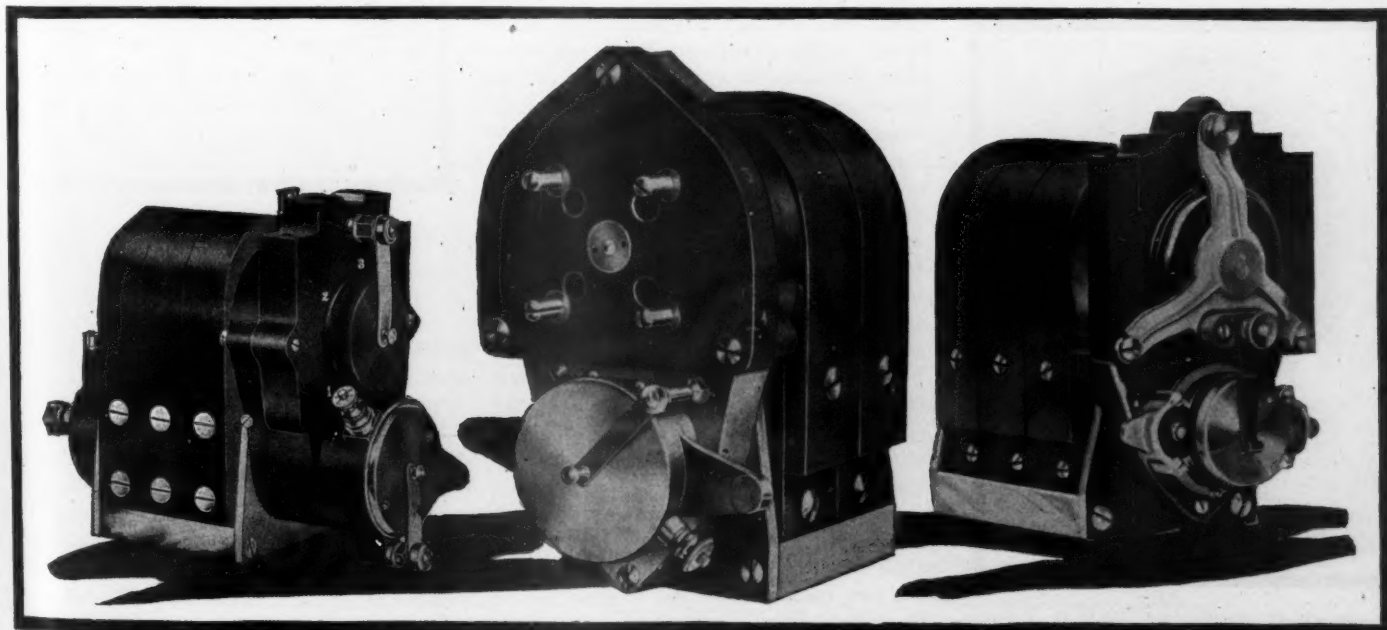


FIG. 25—U & H HIGH-TENSION

FIG. 26—SIMMS MAGNETO

FIG. 27—LARGE BOSCH MAGNETO

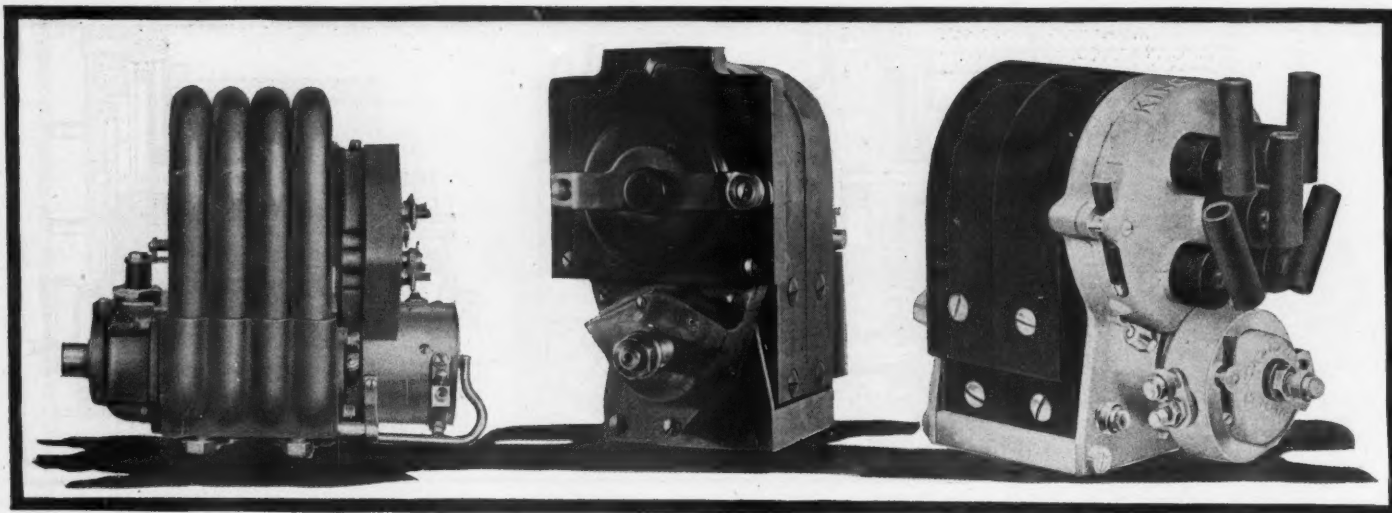


FIG. 28.—HEINZE HIGH-TENSION

FIG. 29—TYPE F PITTSFIELD

FIG. 30—KINGSTON MODEL B

points of induction in the same direction for each half revolution of the armature; one of these points serves for high-speed work and the other, an extended portion, for low-speeds.

Simms magnetos are made for single, twin, four and six cylinder motors; and the company manufactures a simple form of dual ignition equipment for use in connection with all its magnetos for four and six cylinder motors if desired. Conversion from the standard machine to the dual machine is made by exchanging certain parts. Very little modification is necessary. There are two standard types of Simms magnetos, designated S and SU, and they are almost identical in design and construction, except that the model S has two double magnets and a distributor with terminal sockets at the top, a yoke to hold the cover in place, and a contact spring attached thereto to hold the cover of the circuit-breaker in place. The model SU has but two single magnets and an entirely different design of distributor and circuit-breaker box, terminal points being pro-

vided on the face of the distributor, screws being used to hold it in place, and the spring for securing the circuit-breaker box cover extending diagonally downward from a separate post.

A feature of the Simms dual systems is that of their adaptability for use in connection with the gas self-starting mechanisms now being applied to many cars. When the switch is turned to the battery side it is possible to obtain a vibrating spark through an unusually wide range at one of the plugs. The switch, which is of the flush dash type, has combined with it a small vibrator and coil, Fig. 46, that works on the master vibrator principle; but instead of using a separate transformer coil to generate the high-tension current, the current from the battery flows through the switch, the vibrator and the primary winding of the magneto, and back to the battery, thereby producing the high-tension currents in the secondary winding of the magneto in the regular way.

Heinze—The new Heinze high-tension magneto, Fig. 28, is the feature of the Heinze Electric Co.'s line, and it is not unlike the primary armature type made by this concern, except that it has a differently shaped distributor, etc. The Heinze high-tension magneto is a compound armature type requiring no auxiliary coil, and its characteristic feature is its use of round horse-shoe type iron magnets instead of those of square or rectangular section as is the more conventional practice. The company's claims for this construction are: That a stronger and more permanent field is obtained because of the more perfect fit possible in the pole pieces. The ends of the magnets are ground and fitted into reamed and tapered holes in the pole pieces, which does away with magnetic losses due to poor contact. Another feature of this magneto is that instead of grounding one end of the primary winding both ends of it are attached to terminals of the circuit-breaker box from which wire leads are connected to the switch.

Connecticut—The Connecticut magneto, Figs. 40 and 41, are designed along con-

ventional lines, but with many ingenious improvements and characteristics not to be found in other magnetos. Connecticut magnetos are simple in form and of the primary armature type, but might be called high-tension because both the primary and secondary windings are incorporated in the magneto apparatus itself. The secondary or transformer coil being placed above the armature housing, under the arches of the magnets. In this construction an effort has been made to combine all the advantages of the high-tension, double-wound

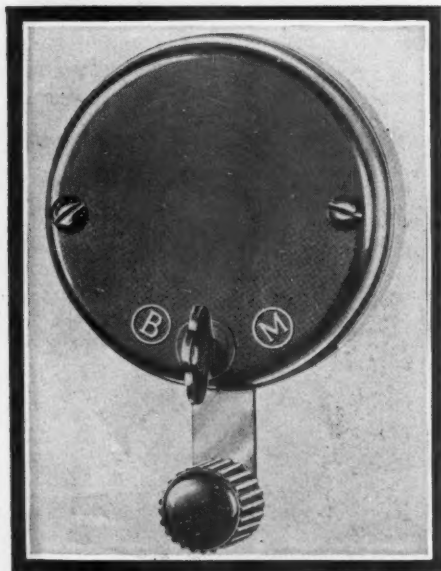


FIG. 31—THE NEW PITTSFIELD DASH KICK-OFF SWITCH WITH ITS KEY IN PLACE. REMOVE KEY, SWITCH LOCKS

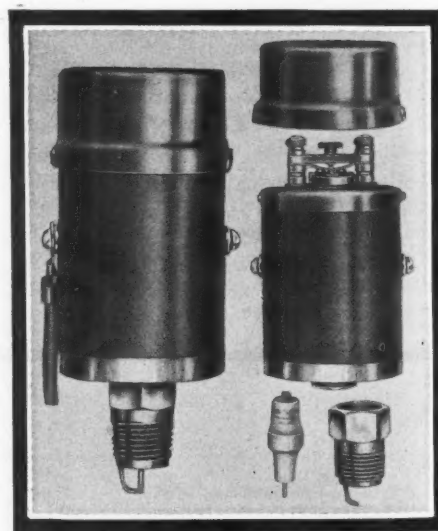


FIG. 32—THE NEW CONNECTICUT SPARK-PLUG INDUCTION COIL, WHICH TRANSFORMS LOW-TENSION CURRENT INTO HIGH-TENSION JUMP-SPARK CURRENT

armature type with those of the low-tension primary armature and separate transformer type without the defects of either. The transformer coil is inserted into the rear end of the magneto and rests in a specially designed recess. The magnets are enclosed in a metal case, and all internal mechanisms are thoroughly insulated and protected from dust and water so that the operation of the apparatus will not be affected by these elements.

Connecticut magnetos are manufactured

in two distinct types, in which the independent or single type may be used as the only source of ignition with one set of spark plugs; or for a double system, in conjunction with a battery system using two sets of plugs, each system then being entirely independent of the other and controlled by the Connecticut combination magneto and battery switch. The company also makes a dual type magneto which combines two ignition systems in one, using but one set of plugs. A starting vibrator, as part of this system, is furnished

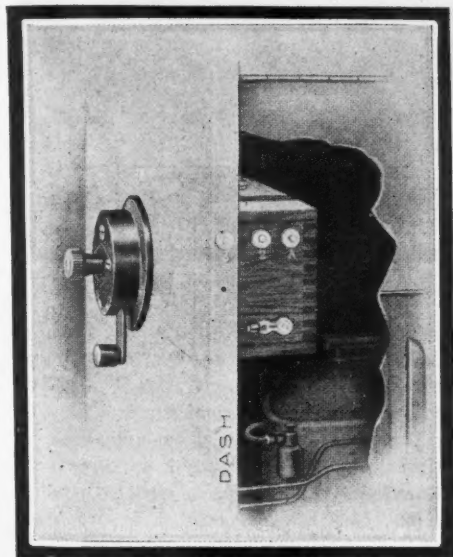


FIG. 33—SPLITDORF'S NEW COIL IN FRONT OF DASH WITH ONLY SWITCH EXPOSED, MAKING NEAT CONSTRUCTION

in a small handsomely finished mahogany case with a kick switch mounted thereon, or in a small sealed fibre tube, Fig. 42, designed to pierce the dash, leaving the switch, Fig. 39, exposed. In this switch there is incorporated a starting vibrator; the switch handle is removable so as to be used as a key, and the push button has a ruby lens in the end which lights up when running on the battery to warn the operator that the battery circuit is in use when the magneto should be switched on. Among other improvements brought out this year: On the rear end of the magneto there is an

indicating arrow for use in connection with line marks on the shaft to facilitate timing; the carbon block and rubber contact of the distributor has been eliminated, and in its place a metallic block is used, which runs .006 or .008 of an inch from the contact block.

National—The National Coil Co. has brought out a new dual ignition system in which its magneto is used as a regular source of current and batteries employed to facilitate starting. In this system there is a separate transformer coil, Fig. 32, for each spark plug, which is designed to be mounted on the motor near the plugs. The new magneto used with this system resembles the model K-4 National magneto of 1911, Fig. 20, in that it is of the primary armature type; but it differs in that a regular low-tension timer replaces the high-tension distributor previously employed. A new method of securing the universal coupling, comprising a tongue design of more substantial construction, has been adopted; and a new composition known as condensite is used for the distributor of the model K-4 for which higher heat resisting qualities are claimed. The switch used in the National ignition systems includes a vibrator which works on the master vibrator principle; and a new kick switch is being brought out by the company which has a lock and key.

Kingston—The Kokomo Electric Co.'s line of Kingston magnetos for the season of 1912 remains unchanged, except for refinements in detail, such as the use of a new and improved composition in the distributor; larger and more durable brushes; a new switch design with a self-starting button; and an extra auxiliary starting button on the side of the coil box, for starting on the spark when the contact points of the circuit-breaker happen to be separated. Kingston magnetos are made in both the primary and compound armature types. The model A is a true high-tension machine, the secondary winding being on the armature and no outside coil required. It differs from the conventional, however, in that the distributor is on the driving end, and the circuit-breaker on the opposite end.

The model B, Fig. 30, has distributor and circuit-breaker on the same end; but it has a single armature winding and uses a separate transformer coil to step-up the current. The model C has no distributor; it is designed for single cylinder motors

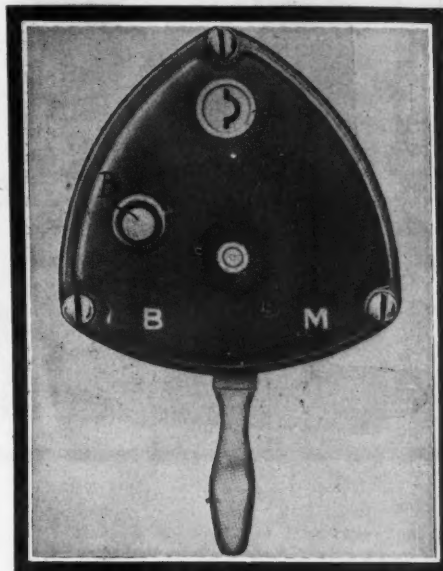


FIG. 36—THE NEW REMY DASH KICK-SWITCH WITH STARTING BUTTON B AND KEY-HOLE L AT THE TOP

or double cylinder motors firing at 180 degrees; and a transformer coil is used in connection with it, that is provided with one or two spark plug terminals. The model D is the same as model B, except that it has three pairs of magnets and is used more generally on heavy, slow running motors.

Pittsfield—Six types of magnetos of the high-tension inductor type, a new self-starting spark device, and a full line of coils, switches, timers and plugs, comprise the Pittsfield line for the season of 1912. The magnetos are designated N-B, which has two sets of double magnets and a wipe-spark distributor; model F, the latest addition to the line, a fixed ignition device with single magnets and a jump-spark distributor; NA which generates four sparks per revolution, and, therefore, is specially adapted for two-cycle work;

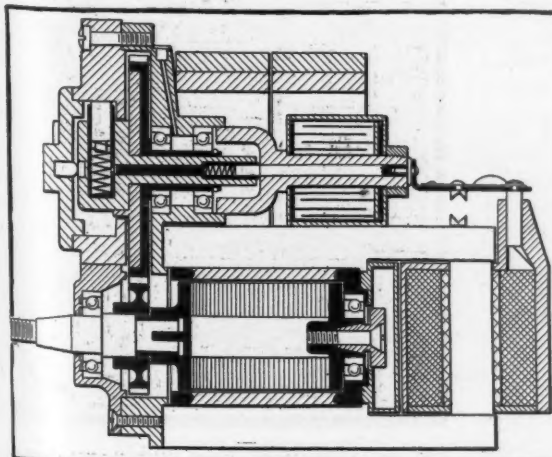


FIG. 34—SECTION OF PITTSFIELD MAGNETO

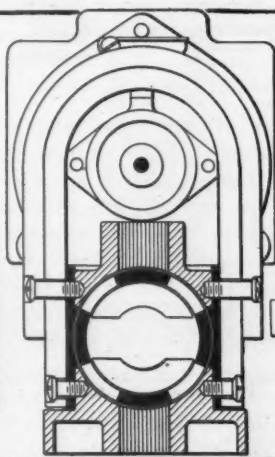


FIG. 35—PITTSFIELD END SECTION

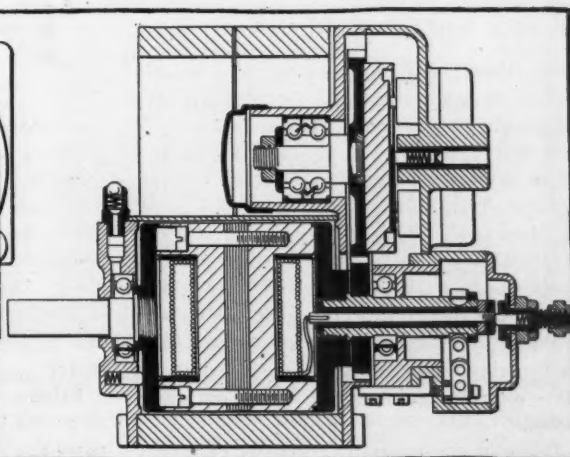


FIG. 37—KINGSTON LOW-TENSION

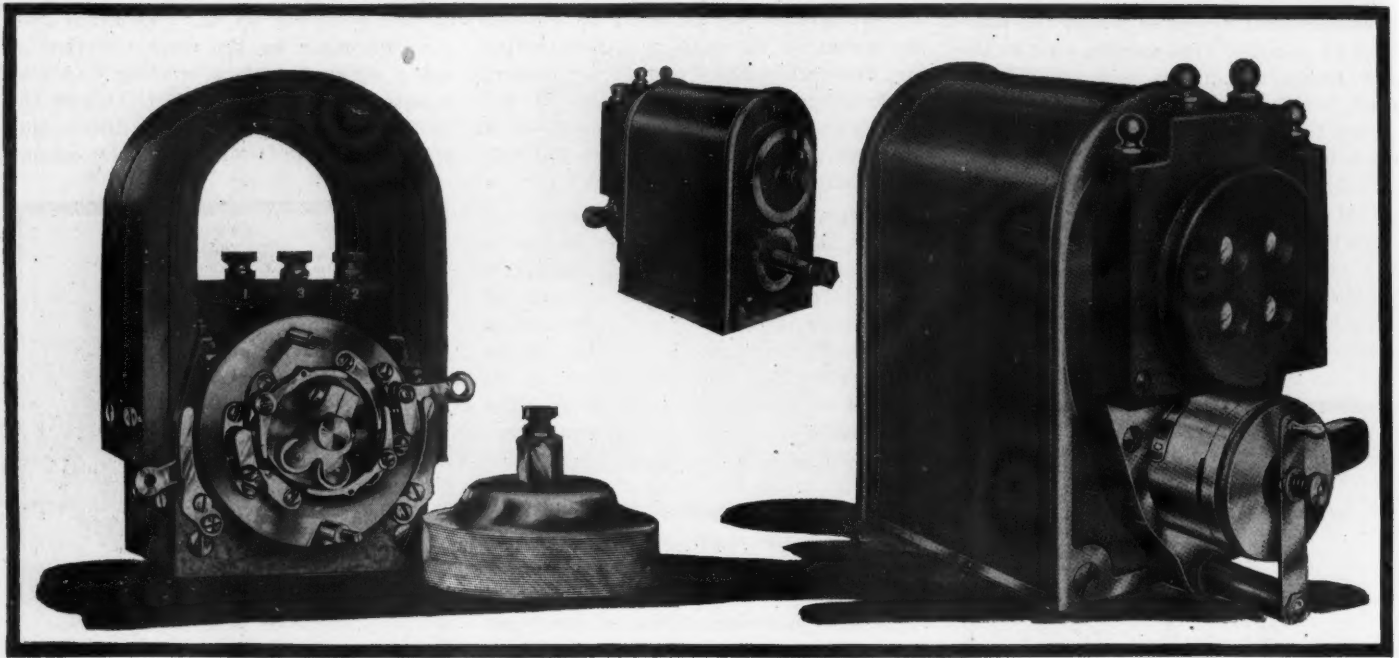


FIG. 38—THE NO-LAG MAGNETO

BACK OF CONNECTICUT

FIG. 41—THE CONNECTICUT MAGNETO

NBD, a machine for a dual ignition system, which is similar to the model NB, except that there is a change in the primary connections of the coil that permits of attachment of a battery wire; NCB, particularly adapted for six-cylinder four-



FIG. 39 — CONNECTICUT DASH COIL SWITCH WITH RUBY LENSE S IN STARTING BUTTON, AND REMOVABLE SWITCH LEVER L, WHICH SERVES AS KEY

cycle work; and NC, which is designed for six-cylinder two-cycle use, though also adaptable to a four-cycle motor. The NCB and NC magnetos differ in that in the NCB only two of the four current waves generated at each revolution of the rotor are used on a four-cycle engine; the rotor revolving one and one-half times crankshaft speed, while in the model NC all four waves per revolution are employed, permitting the machine to run at one and one-half engine speed for a two-cycle motor, or three-quarter engine speed for a four-cycle motor.

Being of the inductor type, the Pittsfield magneto, Figs. 29 and 34, has no windings

on the armature, or, rather, inductor shaft; and it is in a class by itself in that both the low-tension and high-tension windings are arranged externally and mounted vertically at the rear end of the magneto. The rotor, which might be called the armature of the magneto if it had windings upon it, greatly resembles the ordinary armature skeleton in shape, and it operates in an oscillating sleeve which permits of retarding and advancing the spark without reducing the induction or spark producing efficiency of the apparatus.

The new engine-starting device comprises a cylindrical unit dash coil that pierces the dash so that its switch is flush with the exposed side of it. It is built on

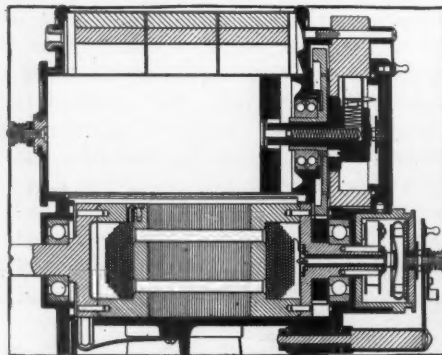


FIG. 40—SECTION OF CONNECTICUT

the master vibrator principle, and comprises a primary coil, a condenser and a vibrator. Three terminals are provided on the back of the unit for attachment of wires, from the primary terminal of the magneto, the ground wire and the battery wire. The switch has, on the face of it, a locking key, which when removed, grounds the magneto to prevent operation of the motor.

Briggs—Two new models have been added to the line of Briggs magnetos for 1912; these are the BC and the D. The line complete, therefore, includes four types: Model

A is the largest and is intended for use on all kinds and types of multi-cylinder internal combustion motors; the C is somewhat smaller and designed for smaller motors, though it is claimed to have worked satisfactorily on six-cylinder motors with 5x5-inch bore and stroke; model BC is similar to the C except that it is provided with a centrifugal governor that automatically controls the spark; and the model D also resembles the C except that it is fitted with a special timer that is claimed to permit of a range of 90 degrees without reducing the efficiency of the spark.

Except for the following slight improvements and the addition of the two above mentioned models, the Briggs magnetos remain unchanged for the 1912 season. In the model A, the spider that holds the distributor has a rigid arm that secures the

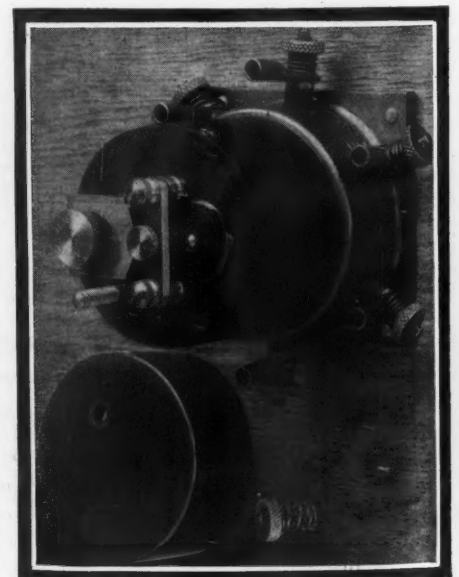


FIG. 42—CONNECTICUT'S NEW DASH COIL, SHOWING ACCESSIBILITY OF VIBRATOR

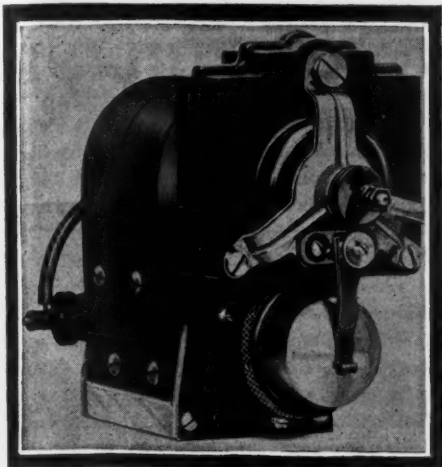


FIG. 43—BOSCH DOUBLE DISTRIBUTER MAGNETO SYSTEMS, USED WITH TWO POINT IGNITION

In construction the two point magneto is identical in every respect with the standard instrument, with the single exception that a second distributor is provided to serve the additional set of spark plugs. To this distributor is led that end of the armature end of the winding which in the standard magneto is grounded. The timing is controlled by the single interrupter which is standard in every respect.

circuit-breaker cover in place. In the C, Fig. 17, a new distributor design is employed in which a vertical extension is provided in back of the high-tension terminals to prevent short-circuits should the apparatus become wet.

The Briggs magnetos are of the primary armature type, having a single low-tension winding on the armature shaft, whose current is transformed into high-tension by an auxiliary dash coil.

The arrangement of the high-tension distributor over the circuit-breaker at one end of the machine is conventional; and a feature of the construction is the enclosure of the magnets and rear end of the machine in a metal dust and water-proof

case. In the model A the armature and distributor shafts both run on ball-bearings. The magnets are large and carefully fitted to the pole piece. The distributor is made of hard rubber with a secret compound added, which gives it a reddish brown appearance and renders it peculiarly impervious to heat. The circuit-breaker is of simple and sturdy construction, the parts are heavy, and the cam is made of steel case-hardened, and operates a case-hardened roller on the striker arm. The circuit-breaker parts are lubricated by means of an oil cup which feeds oil to the cam by means of a wick. Contact points

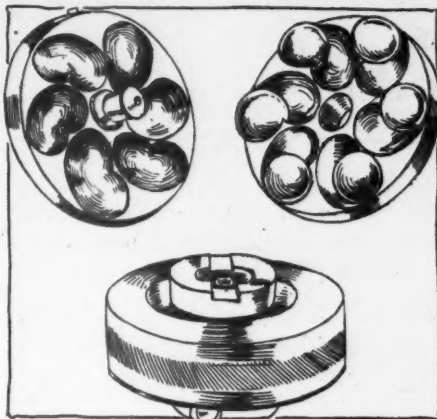


FIG. 45—HERZ TIMING GOVERNOR

are heavy pieces of platinum iridium with positive means of adjustment, and a shield is provided to protect them from oil. A feature of the model C magneto is an oil tank placed in the arch of the magnets, which holds six ounces of oil. The oil feeds automatically from the tank to all bearings and this tank should hold sufficient oil for 15,000 miles of travel.

No-Lag—The No-Lag magneto, Fig. 38, is a machine of the primary armature type brought out shortly after the New York Garden show of 1911. It has but a single primary winding on the armature of the magneto, a double circuit-breaker on the

front end of the armature shaft and a condenser box mounted over the armature between the pillars of the magnets. Two alternating waves of current are generated in the armature winding of this machine at each revolution. One of these waves of current is interrupted by one pair of contact points of the circuit-breaker and the other wave by another similar pair of contact points located directly opposite on the other side of the circuit-breaker.

The transformer, or induction coils, used to convert these primary or low-tension waves of current into high-tension current are two in number, compactly arranged in a single box. One of these units transforms one wave and the other the other wave.

Herein lies the No-Lag principle. By alternately performing the work that gen-

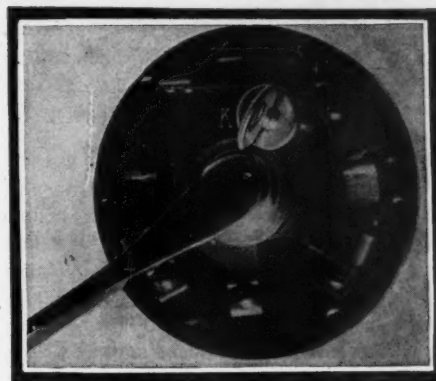


FIG. 46—THE NEW BRIGGS KICK-SWITCH

It has a removable key K, which when in place and rocked or turned from side to side causes a make and break at the point P, and causes sparks to occur at one of the plugs

erally is done by a single unit transformer coil the efficiency is claimed to be increased, so that the spark occurs in the cylinder at the same time that the break occurs at the contact points of the circuit-

(Continued to page 108)

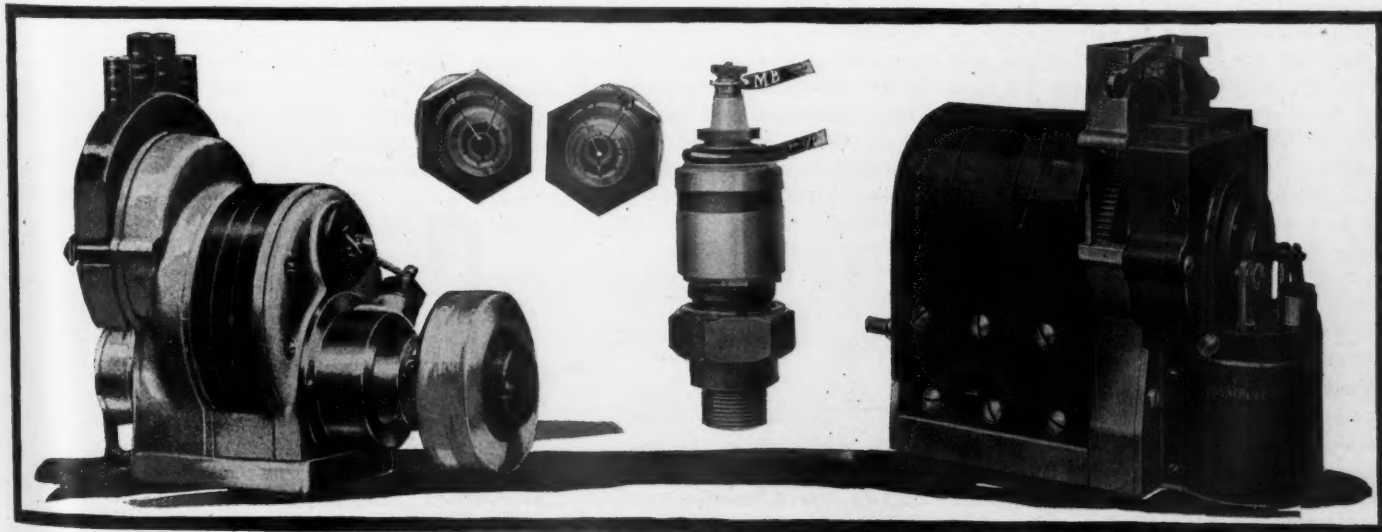


FIG. 44—HERZ HIGH-TENSION MAGNETO AT THE LEFT. DUPLEX PLUGS IN THE CENTER. DUPLEX MAGNETO AT THE RIGHT

One end view of plug shows position of the hammer X when forming the ground for the high-tension electrode Y. The other end view shows the magnetic hammer XI, in action on low-tension, breaking from the contact P. The high-tension electrode is marked YI in this illustration. The lead M. B., at the top of the plug is the high-tension lead; and the lower one J P is the low-tension lead.

Progress in 1912 Axle Construction

Practically All Makers Add Floating Types to Their Lines—
Driving Shaft Ends Are Secured to Wheels—Pleasure
Car Axles Are Used as Jackshafts—Bevel Gear
Differentials Most Generally Used

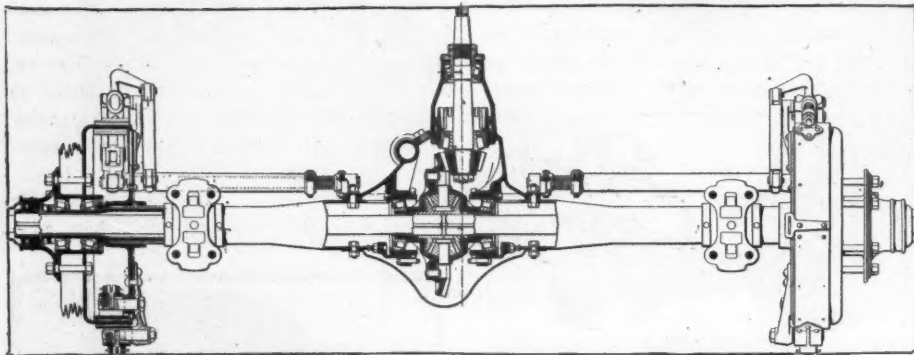


FIG. 1—SHOWING DETAILS OF NEW TIMKEN FLOATING AXLE

AS for the progress in axle construction for the season of 1912, the popularity of the floating type of rear axle has led practically all makers to add this axle to their lines; while, on the other hand, all makers of floating type axles have in one sense reverted toward the semi-floating type by adopting one of its most desirable features. This feature is the rigid attachment of the rear wheels to the driving shafts. Most manufacturers have done this by either forging or otherwise securing a flange to the end of the axle driving shaft which is bolted to the hub or outer flange of the hub; in most cases an extension being made to the hub flange bolts for the attachment of the driving shaft flange. This construction has lead one or two makers to call their axle a three-quarter floating type, but whether or not this term will hold remains to be seen. Pleasure car rear axle manufacturers have found that the ordinary rear axle construction is very suitable as a jackshaft for chain driven vehicles, and have converted their mechanisms for such uses by simply attaching sprockets to the ends of the driving shafts and providing facilities for the attachment of the radius rods. There is a marked tendency toward the unit assembly of gearsets with jackshafts and rear axle. Two makers are bringing out an internal gear drive axle as standard equipment. And practically all differential mechanisms are of the bevel gear design.

Timken—In addition to its regular line of front and rear axles for pleasure and commercial cars, the Timken-Detroit Axle Co. is now making three new truck outfits, comprising combination rear axles and jackshafts for chain-driven vehicles. There are no radical changes in the standard types of axles made by this company, but several notable improvements are to be found. In the front axles for pleasure

cars, for instance, the yokes at the ends of the cross rods are of tapered design instead of angular, giving additional strength and an improved appearance. The yokes are fitted with hardened and ground steel bushings having an adjustable tapered bearing on the yoke pins; and the yoke

As for the rear axles for pleasure cars, the brakes of the larger axle have been increased from 14 to 17 inches in diameter; while those of the smaller axle have been increased from 12 to 14 inches. The internal brakes now are adjustable without removing the wheels. The drive and pinion shafts are of nickel steel with the dogs on the ends of the driveshafts forged integral. A feature of the larger pleasure car rear axle is that of driving the rear wheels through a steel flange that bolts to the hub flange, instead of through a dog clutch that meshes with notches in the hub; the advantage claimed for this being that longer life should be obtainable while driving through the steel of the hub than through the cast steel. In the hubs of the differential the cups now are adjustable instead of the cones, which permits of the cones being pressed on to the shafts, thereby reducing wear. The torque rod pins are provided with adjustments to prevent them from rattling. And driving gears and pinions are ground in, to promote smooth and silent operation. All moving parts are on Timken adjustable roller bearings.

Weston-Mott—The Weston-Mott Co. has

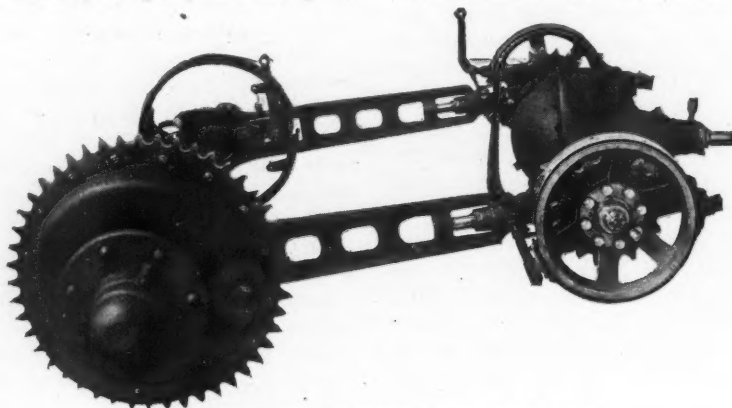


FIG. 2—NEW TIMKEN COMMERCIAL CAR OUTFIT

pins are secured in the arms with bicycle keys. The bearing surface of the pins has been increased, and dust caps are fitted over the heads, whilst the steering balls are ground true and smooth.

made quite a number of radical changes in axle design for the season of 1912. The company now has seven new axle designs in which the gearcase cover opens up directly to the back, allowing the differen-

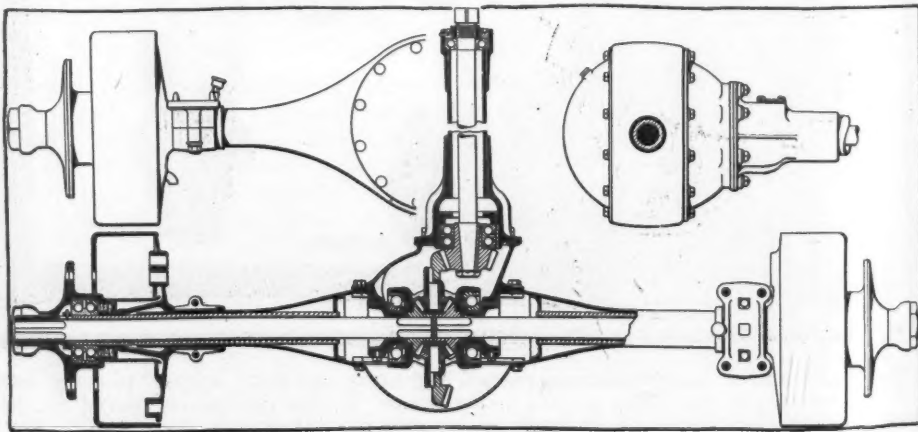


FIG. 3—SECTION OF LATEST WESTON-MOTT FLOATING AXLE

tial to be taken out of the axle. These are all of the single bearing floating type, viz., the hubs being driven by the hub flanges, which are fastened directly to the driveshafts. This makes a very neat design and does away with the large, clumsy looking hub which was used on the double-bearing floating type axle. On the lighter types of these axles high carbon steel shafts are used, or the nickel steel shafts may be fitted, while on the larger axles either nickel steel or chrome vanadium shafts are used. These axles are designed for cars weighing from 2,000 to 5,500 pounds. One of these axles is especially designed for use on electric cars. Besides these new designs, the company has its regular types of vertical split axles, also two types of axles which are split horizontally. Taking in all the designs, the company makes axles for cars weighing from 1,000 to 5,500 pounds. In the way of front axles, the company makes almost any type of axle with I-beam centers, and can also furnish the different styles of tubular axles. Truck axles for cars up to 1½-ton capacity also are features of the line. Most of the Weston-Mott Company's axles can be furnished with either internal or external brakes, or double internal brakes, and practically all types can be made with either semi or floating type hubs. A new type of scissors brake is be-

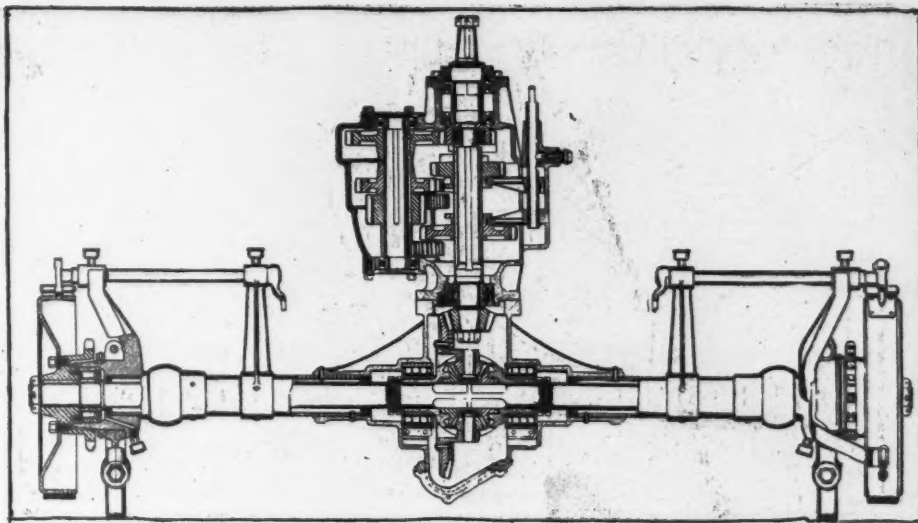


FIG. 4—WARNER MFG. CO.'S COMBINED GEARSET AND JACKSHAFT

forged integral; drop forged heat treated steering knuckles are employed, which have a long bearing surface on hardened and ground steel pins, and Bower roller bearings are standard equipment in the front wheel hubs.

The rear axles are of a floating type, with the differential unit mounted on single row annular ball bearings, the driving axle ends on double row annular ball bearings, and the pinion shaft on a double

notches on the outer edge of the hub, a steel flange is pressed onto the squared ends of the driving shafts, which is secured direct to the hub-flange bolts. The drawing shows that there is a threaded projection on the heads of the hub flange bolts, and the steel flanges on the axle shaft ends are fastened to these with nuts. This eliminates wear and lost motion between the wheels and drive shafts, and relieves the entire transmission mechanism of the strains that occur when lost motion is present. Ball thrust bearings are provided to take the lateral thrust of the differential units and ample provisions also are made for adjusting the gears so that they may line up properly. Both brake levers are brought in toward the center so that the rods are inside of the chassis frame; and there are no internal brake adjustments that require the removal of the wheels when adjustment is necessary.

American—Floating rear axles and I-beam drop forged front axles are the chief products of the American Ball Bearing Co. for 1912, but an interesting feature of the line is the Lanchester worm-drive axle. In this axle the worm is of a special alloy steel, while the larger gear is made of a special bronze alloy. Ball bearings are used throughout the American axles. In the front axle there is a ball-thrust bearing at the upper end of the steering knuckle pin, while the front wheel spindles are equipped with adjustable cup and cone bearings. In all floating types of American axle design, the differential mechanism with the bearings upon which it is mounted may be readily removed as a unit. Accessibility to the vital parts of the rear axle mechanism is recognized as very essential in American axle construction. Ample provisions have been made for the adjustment of the driven gear relative to the driving pinion, so that noiseless operation may be maintained.

Lefever—A selective type transmission gearset with one rod control, coupled with a jackshaft provided with brake drums, is one of the features of the Lefever

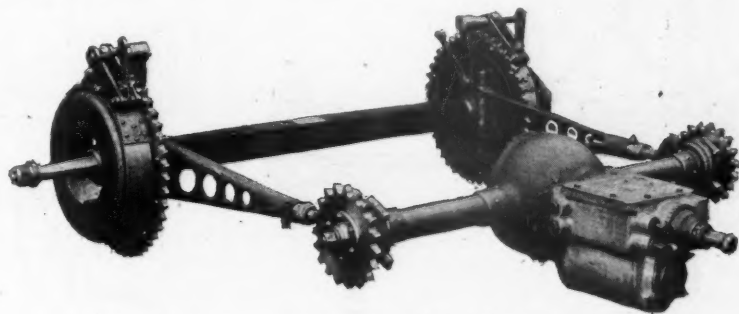


FIG. 5—THE NEW SHELTON COMMERCIAL CAR OUTFIT

ing used on the double internal design, which has been found very effective and smooth acting. Single and double row annular balls are used throughout this mechanism.

Metal Products—The Metal Products Co. of Detroit devotes its plant exclusively to the manufacture of front and rear axles for motor cars.

The Metal Products Co.'s front axles are steel drop forgings. The spring seats are

row annular ball and a Hyatt roller bearing. The feature of the rear axle construction is the continuous pressed steel housing, whose webbed design makes an unusually strong reinforcement. The housing is made in two halves, which are riveted together and then welded by the oxy-acetylene process. Another feature of this axle is the means of securing the ends of the driving shafts to the wheel hubs. Instead of a dog clutch which slips into

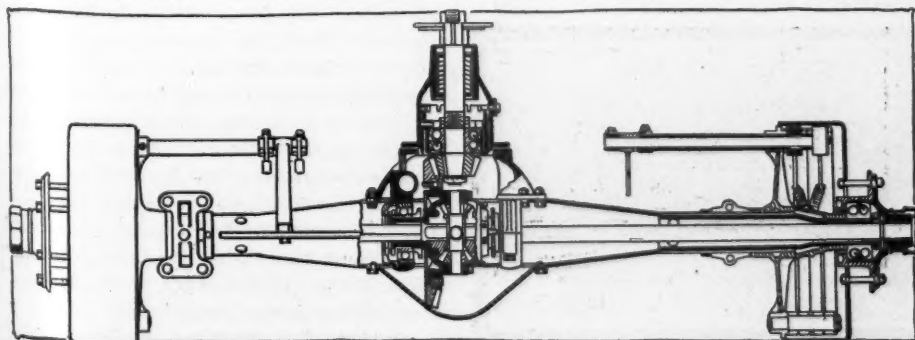


FIG. 6—SHOWING FEATURES OF METAL PRODUCTS CO.'S FLOATING AXLE

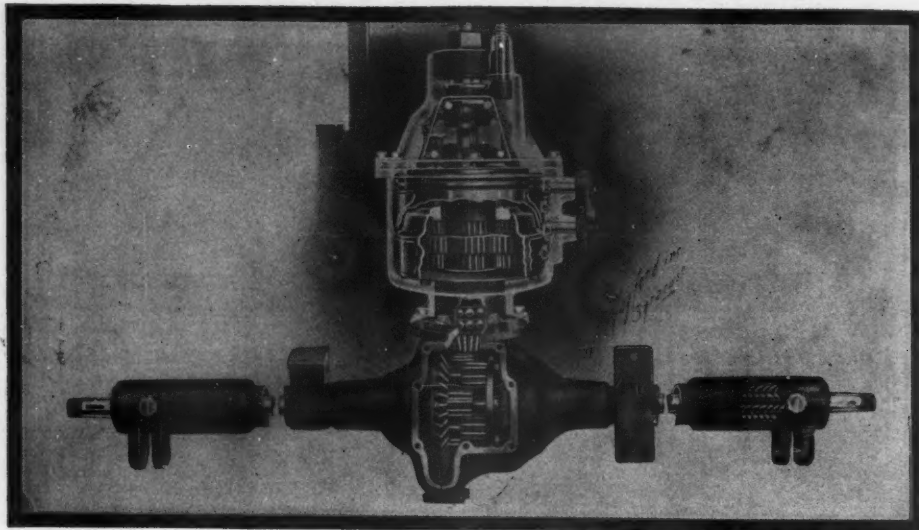


FIG. 7—LEFEVER ARMS CO.'S PLANETARY GEARSET AND JACKSHAFT

Arms Co.'s line. This company also manufactures a planetary transmission gearset and jackshaft for commercial vehicles. Both the selective type and the planetary gearset have the same size face of flange, which permits the assembly of the jackshaft in the frame independently, and then either the selective or planetary gearset coupled thereto. The planetary gearset and jackshaft combination is shown in Fig. 7.

Warner—In addition to its transmission gearsets, steering gears, etc., heavy duty truck and light-delivery jackshafts are features of the Warner Mfg. Co.'s line. These jackshafts have in unit with them the Warner jackshaft transmission gearsets, which are a selective sliding gear type, giving three forward speeds. This combination jackshaft and gearset assembly comprises contracting brakes on the ends of the jackshafts, strut rod connections centered on the shaft and fitted with a joint for side motion, and the sprocket centers are directly over the roller bearings. Bower roller bearings are used on the ends of the jackshaft, the driving and differential gear unit is mounted on Hyatt high duty bearings, while in the gearset the main shaft is mounted on double row annular ball bearings and two sets of single annular ball bearings. Single annular ball bearings are employed for the countershaft.

Driggs-Seabury—The Driggs-Seabury Ordnance Corporation is making several

styles of I-beam dropped forged axles with wheel spindles equipped with double row New Departure annular ball bearings, and is featuring two designs of floating rear axles for pleasure cars. One of the lat-

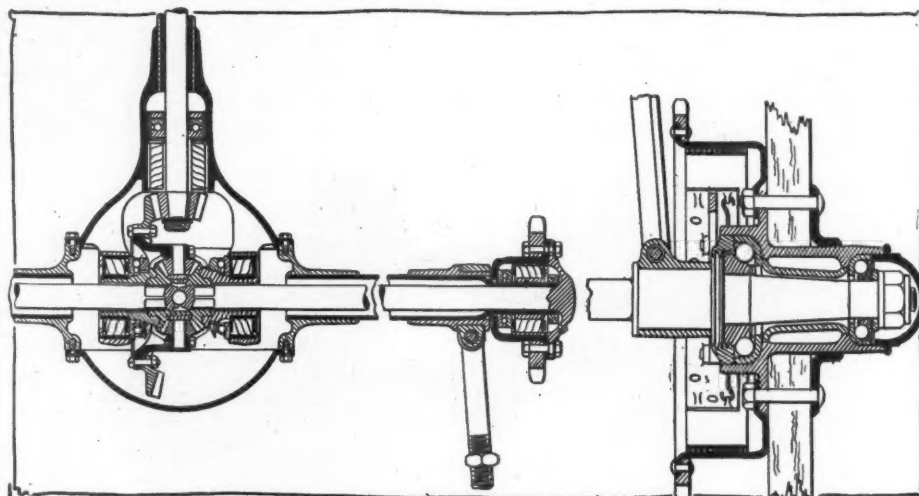


FIG. 8—SECTION OF SHELDON JACKSHAFT AND REAR AXLE END

ter, Fig. 8, is similar in design to what another concern terms a three-quarter floating type. In this axle are combined, it is claimed, all the advantages of both floating and semi-floating types, with improvements upon each. The center or main body of the axle is formed of a hydraulically-pressed steel housing extending in one unit from hub to hub and so designed that loads are carried on wrought

steel making a strong construction.

The differential housing and its accompanying driving mechanism are inserted in the pressed steel axle center through a suitable opening at the front and then securely fastened in place, while at the rear of the axle a similar opening is provided which allows the removal of the differential and driving gear unit with its accompanying bearings, without the necessity of removing the wheels or any other portion of the axle, excepting the driving shafts. This greatly facilitates any necessary inspection or repairs. The wheels are driven through integrally forged flanges on the outer ends of the driving shafts which are bolted securely to the hubs of the wheel. Brake drums are 14 inches in diameter and 2 inches in width, and any type of brake lining may be employed. The brake operating levers are arranged so that all rods may be attached from inside the frame, and these levers can be located along their shafts in practically any desired position demanded by the peculiar exigencies of the chassis design. The propeller shaft is housed in a

torsion tube and is connected to the driving pinion by the company's design of splined sleeve construction. Imported annular ball and thrust ball bearings are used throughout in the construction of this axle, which is designed for cars weighing from 2,500 to 3,500 pounds. The company also makes a regular floating type of axle for cars weighing from 2,700 to 3,400 pounds. This axle varies in several points of construction. The jaw clutches on the end of the axle shaft, for instance, are not secured to the hub flanges. Instead of having a single annular ball bearing mounted on the axle casings directly under the spokes, in this construction there are two double row annular ball bearings at either end of the wheel hub. Double row New Departure annular ball bearings are used throughout the entire construction. And there is a slight difference in the arrangement of the brake control rods.

Sheldon—The feature of the Sheldon Axle Co.'s line for 1912 is the combination

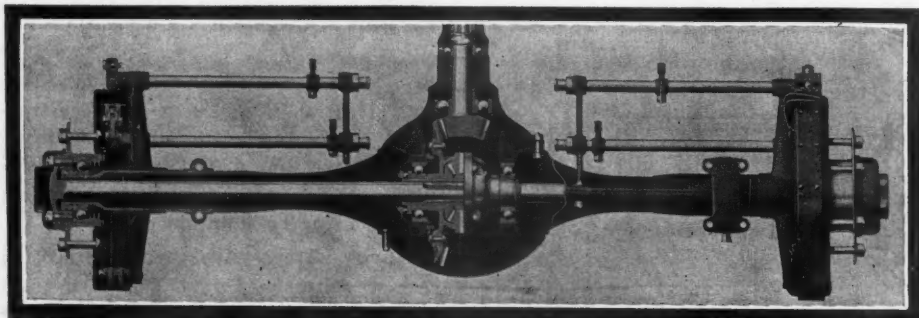


FIG. 9—A NEW DRIGGS-SEABURY FLOATING TYPE AXLE

rear axle and jackshaft equipment brought out by this company several months ago. This equipment comprises one model having a selective gearset bolted in unit with the driving and differential gear mechanism of the jackshaft, and a complete rear axle with adjustable radius rods communicating between it and the jackshaft. The combination gearset and jackshaft unit, Fig 5, is very similar in design to the rear axle constructions used in pleasure vehicles. The gearset has both its main and countershaft in the same vertical plane, and gives three forward speeds and reverse. The gearset is small and compact and is bolted to the spherical steel housing of the driving gear and differential mechanism. Hyatt roller bearings and ball thrust bearings support the driving and differential gear unit, and adjustable cup and cone

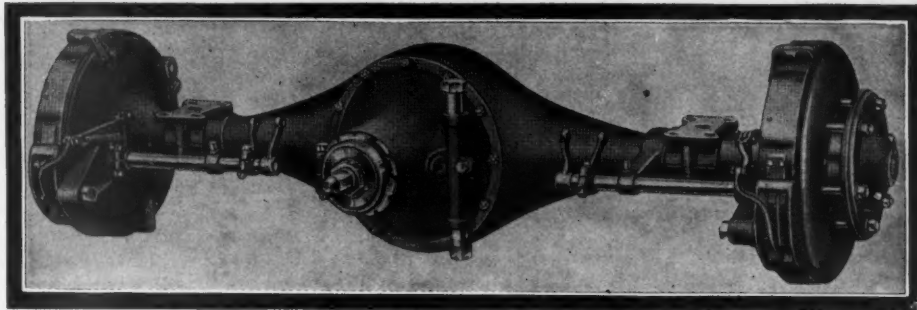


FIG. 11—THE NEW LEWIS FLOATING TYPE AXLE

ing flange which is integral with the ends of the driving shaft. A single Hyatt roller bearing is mounted directly under the spokes and a thrust bearing is fitted, or, a German annular bearing may be fitted without the thrust bearing. Hyatt high duty roller bearings and ball thrusts are

parture double row bronze separator type. The differential is of the bevel gear type; and 3½ per cent nickel steel, heat treated, is employed in the shafts and gears. The differential and driving gear mechanism, together with the driving pinion is mounted on a cast steel carrier on which all adjustments are carried so that the entire assembly may be removed if necessary without disturbing any adjustments. The housing is formed of hot rolled steel made in two halves, welded together by the oxy-acetylene process. The tubes which carry the wheel bearings are separate from the main housing and carried back to within 1 inch of the differential, being supported on diamond shaped plates welded to the housing, and also being welded to the main housing in various places, making practically a one-piece construction. Brakes are 14 inches in diameter, of internal and external design; and pure asbestos weave linings, specially treated, are used.

Muncie—In addition to a complete line of front and rear axles, the Muncie Gear Works now is marketing specially designed equipment for commercial trucks, among which are combination planetary or selective sliding gearsets, arranged in unit with the differential and driving gear mechanism of the jackshaft, the radius rods and driving sprockets secured near the ends of the jackshaft. Rear axles also may be added to the equipment to make it com-

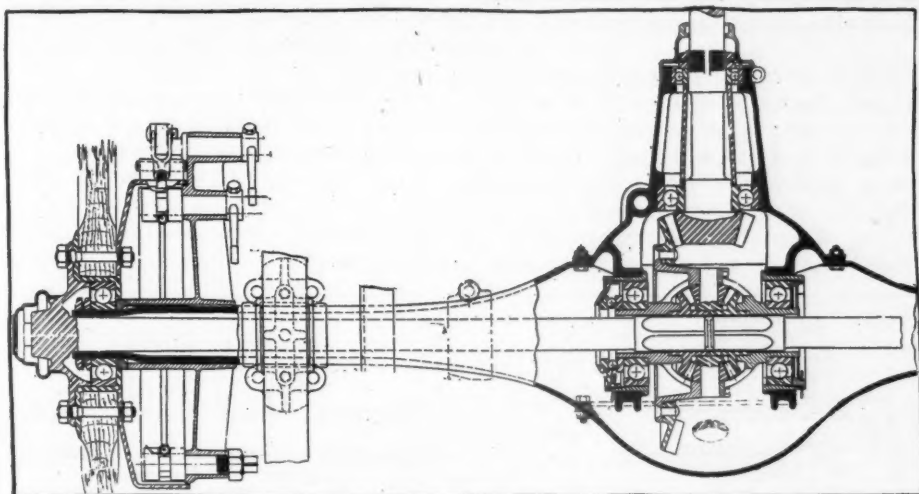


FIG. 10—A SECTION OF THE McCUE CO.'S FLOATING AXLE

bearings are employed at the outer ends of the jackshaft and on the rear axle spindles. This equipment is for trucks of from 1,100 to 2,500 pounds capacity, and is designated TD-13.

There also is another equipment designated TD-52, which does not have a gearset in unit with the jackshaft mechanism. This mechanism is designed for larger vehicles and differs from the one previously described chiefly in that its jackshaft mechanism is a floating design with Hyatt roller bearings used at the outer ends as well as throughout the differential and driving gear housing.

The Sheldon Company also is introducing this year a new floating type of rear axle for pleasure vehicles which is designated 201-D. It is a neat design, with the propellor shaft inclosed in a torsion tube, which is rigidly secured to the housing of the differential and driving gear mechanism. A large cover is provided at the rear of the housing through which the entire differential mechanism may be readily removed. The brakes have a 14-inch diameter and 2-inch face and are of the external contracting type. Hubs are of pressed steel; and the face of the brake drum is the inner hub flange, which makes a light and substantial construction. The outer hub flange is reinforced by a driv-

employed in the differential and driving gear housing.

Lewis—The Lewis Spring and Axle Co. has brought out a new floating type of axle for 1912 which is designated No. 16. In this axle the differential, driving pinion and hub bearings are of the New De-

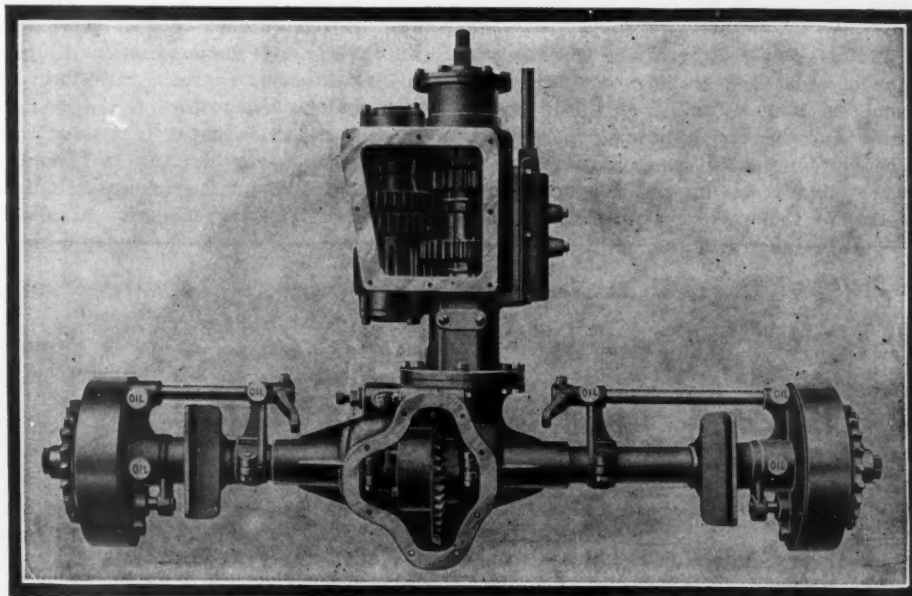


FIG. 12—NEW COMBINED GEARSET AND JACKSHAFT OF MUNCIE GEAR WORKS

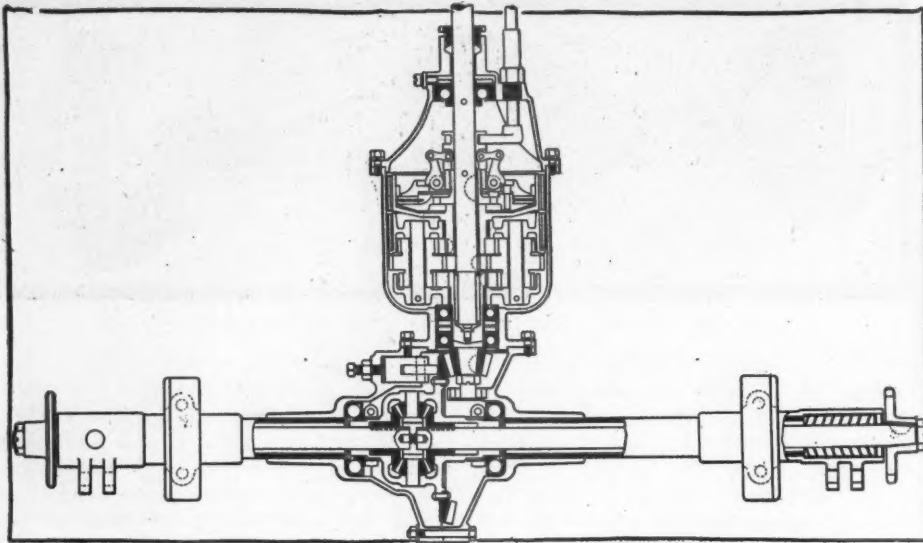


FIG. 13—MUNCIE COMBINED PLANETARY GEARSET AND JACKSHAFT

plete. In this mechanism, Fig. 12, the transmission and driving gear shafts are mounted on New Departure ball bearings, while Hyatt roller bearings are employed at the outer ends of the jackshaft. The hub bearing of both the front and rear axles are mounted on New Departure double row ball type of annular bearings.

The Muncie Gear Works also is marketing this year a selective sliding gear transmission which is made especially for motor trucks and delivery wagons. The use of extra wide-faced gears is a feature of these gearsets.

Another feature of the line for 1912 is the new model G, three-quarter floating rear axle, Fig. 14, for two-passenger cars of not over 1,200 pounds capacity having a motor ranging from 16 to 20 horsepower. This axle is called a three-quarter floating type because it resembles the floating rear axle in that the wheel bearings are mounted externally on the outer ends of the rear axle casing so that the load rests thereon, but at the same time the hubs of the wheels are secured to the ends of the driving shaft as in a semi-floating type of rear axle.

McCue—The feature of the McCue Co.'s line of axles and forgings for 1912 is a complete range of sizes of I-beam front axles and floating types of rear axles. There are practically no radical changes, except that a new internal support is provided for the brake control shaft, a new

style of positive brake adjustment is employed, the spring seat construction is improved, and flange hub drive has been adopted in which a flange is fitted to a taper on the ends of the driving shafts and secured by a key and nut.

The McCue front axles are made in various styles, and for cars of various

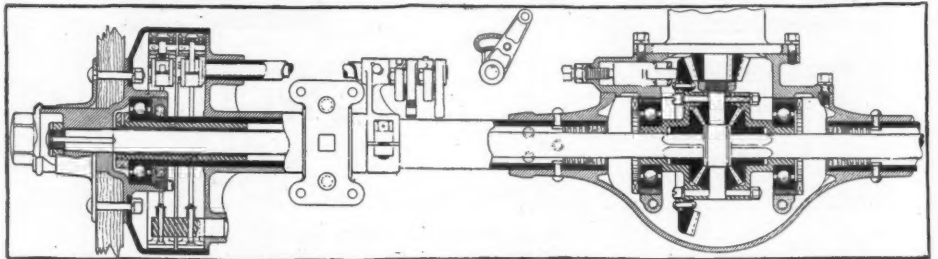


FIG. 14—THE MUNCIE SO-CALLED THREE-QUARTER FLOATING AXLE

weights. Steering knuckles are plain in some types, while in others the ball-thrust bearing is employed at the upper end of the steering knuckle pin. As for the wheel spindle either annular ball or roller bearings may be fitted.

One of the features of the rear axle line for 1912 is the construction of models XX and 4X, Fig. 10. These axles are designed for high-class cars requiring rigid but light construction. They are of the floating type and the axle housing is made of steel and in one piece, tapering in thickness from 3/16 inch at the center, 5/16 inch at the end. The driving shaft and driving

flange are integral and the flange is designed to be secured to the hub of the wheel by six 9/16-inch bolts on a 7-inch bolt circle. The wheel bearings are arranged directly under the center of the spokes so that friction is decreased to the lowest possible point for wheel bearing construction. Annular ball bearings are invariably used in the hubs, but either annular, roller or cup and cone bearings can be used. The model 2X rear axle differs from the model 4X in that in the latter the housing may be opened either from the front or the back to permit inspection, repair or removal of the driving and differential unit. In the model 2X the housing opens only from the front.

Hess—The Hess Spring and Axle Co. is making several styles of I-beam drop forged front axles with either plain, ball or roller bearing spindles; and a floating design of rear axle, designed for use in pleasure vehicles. The rear axle, Fig. 15, is a neat construction in which the center of main body of the housing is formed of pressed steel and extends in one unit practically from hub to hub. The differential and driving gear unit together with its accompanying driving mechanism, are inserted into the pressed steel axle center

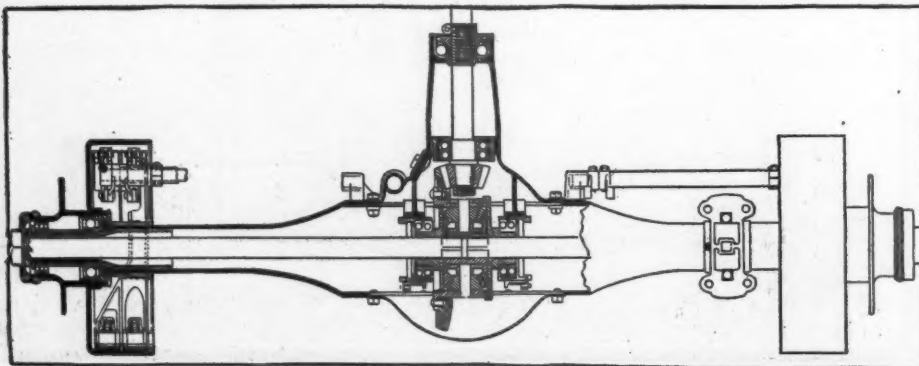


FIG. 15—FLOATING AXLE OF HESS SPRING AND AXLE CO.

through a suitable opening at the front and then securely fastened into place, while at the rear of the axle a similar opening is provided which permits of the removal of the differential driving gear unit and its bearings without the necessity of removing the wheels or any other portion of the axle except the driving shaft. This greatly facilitates any necessary inspection or repairs. The wheels are driven through integrally-forged jaw clutches that mesh with jaws in the hubs of the wheels. Adjustable bearings are used and ample means of adjusting them are provided. Brakes are both of the internal expanding type, arranged side by side and operating on the same drum, the control rods telescope, one within the other, and the levers are located near the center so that the brake rods will be inside the chassis.

Salisbury—The Salisbury Wheel and Mfg. Co. is marketing an up-to-date style of floating rear axle whose characteristic features include: a single annular ball bearing mounted externally on the axle sleeves and arranged directly under the spokes of the wheels; integral driving flanges on the outer ends of the driveshafts

which are secured to the flange bolts of the hubs; a differential and driving gear unit which is inserted through an opening in the pressed steel housing, and whose large bevel gear and differential mechanism may be separately removed as a unit from a similar opening at the rear of the axle; and two sets of internal expanding brakes, arranged concentric with each other, and operating on individual drums. The brake-operating rods are separate and run parallel with each other, and are brought in toward the center of the axle so that the connecting rods will be inside of the chassis frame. A triangular torque member is used in connection with it. Annular ball bearings are used throughout.

Collins—The Collins axle, made by the Collins Axle Mfg. Co., differs radically from any of the conventional axle designs now on the market in that it furnishes a direct drive to the driving wheels on all speeds. This change gear mechanism, giving two speeds forward and one reverse, may be contained in the same size axle housing that usually is employed for a single driving bevel gear and pinion with differential case, and weighs but little more. As shown in Fig. 18, the power is applied to the shaft P S, which carries the two driving pinions P and P1. Diametrically the

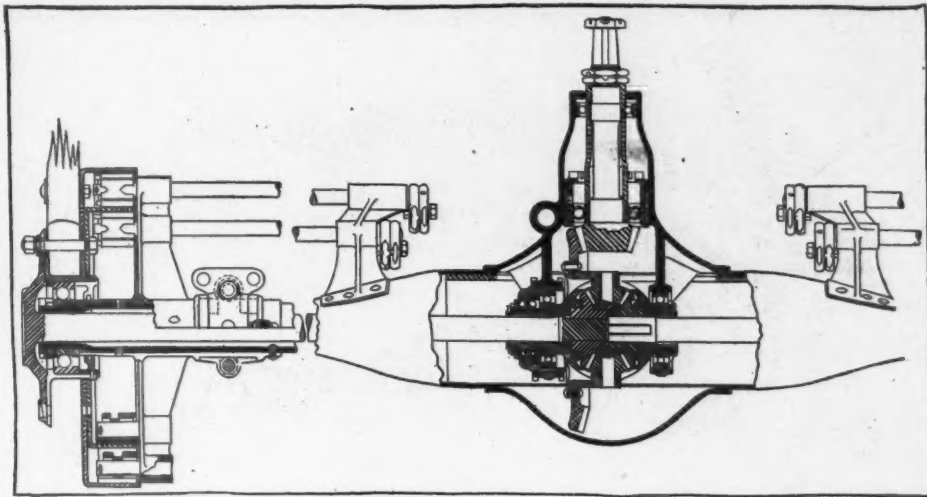


FIG. 17—NEW FLOATING AXLE OF SALISBURY WHEEL AND MFG. CO.

Thus if the low speed gear B is engaged by clutch K, the pinion P would drive that gear direct on the upper side, the power applied to shaft PS also would drive the high gear B, which in turn would drive pinion P2 and also the pinion P3, as they are in one piece, which means that the power is applied to opposite sides of the gear B, the pinion P pushing down and the pinion P3 lifting up. It is impossible

shows that power is transmitted to the idler pinions through the reverse gear. It is impossible to get any of the gears out of alignment as the entire mechanism is self-contained, each driven gear floats between two drive pinions, and is carried directly on the differential housing when engaged by one of the clutches.

Torbensen—Torbensen Gear and Axle Co. is now making three sizes of the Torbensen transmission axle for delivery wagons ranging from 1,000 to 1,500 pounds capacity up to and including trucks of 3-ton load capacity. The Torbensen axle, Fig. 16, is a radical departure from the ordinary in that it is a combination of dead, I-beam axle and jackshaft, with the wheels bearing on the ends of the dead axle and driven through internal gears and pinions on the ends of the jackshaft. In this construction the axle proper is a solid and continuous piece from one wheel to the other. It is preferably made of I-beam section, drop forged of a special grade of steel having great toughness and high elastic limit. This I-beam carries the load, and to it and behind it is fastened the jackshaft in such a manner that it forms a component part of it.

The driving gears are entirely inclosed

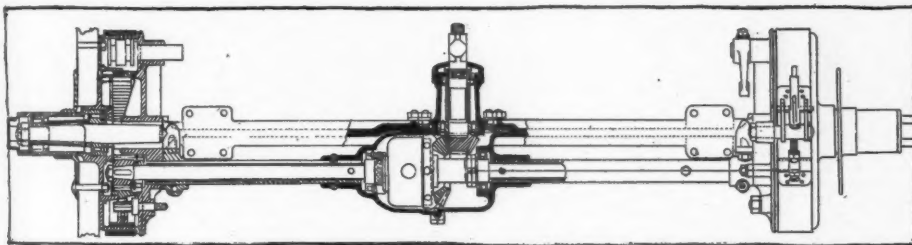


FIG. 16—TORBENSEN INTERNAL GEAR DRIVE AXLE

opposite these driving pinions two idler pinions P2 and P3 of the same numbers of teeth, are placed. These idler pinions engage the same gears as the driving pinion and form a gear chain, whereby all angular thrust is counteracted and the load automatically distributed over all the gears engaged, regardless of which is clutched with the differential housing.

to break the teeth of one of the driving pinions without breaking teeth of the other at the same time, therefore it should be possible to carry double the load which ordinarily can be applied. The low speed pinion P drives downward on the low speed forward gear B and upwards on the reverse gear B2, which eliminates all bending stresses to the driveshaft. This also

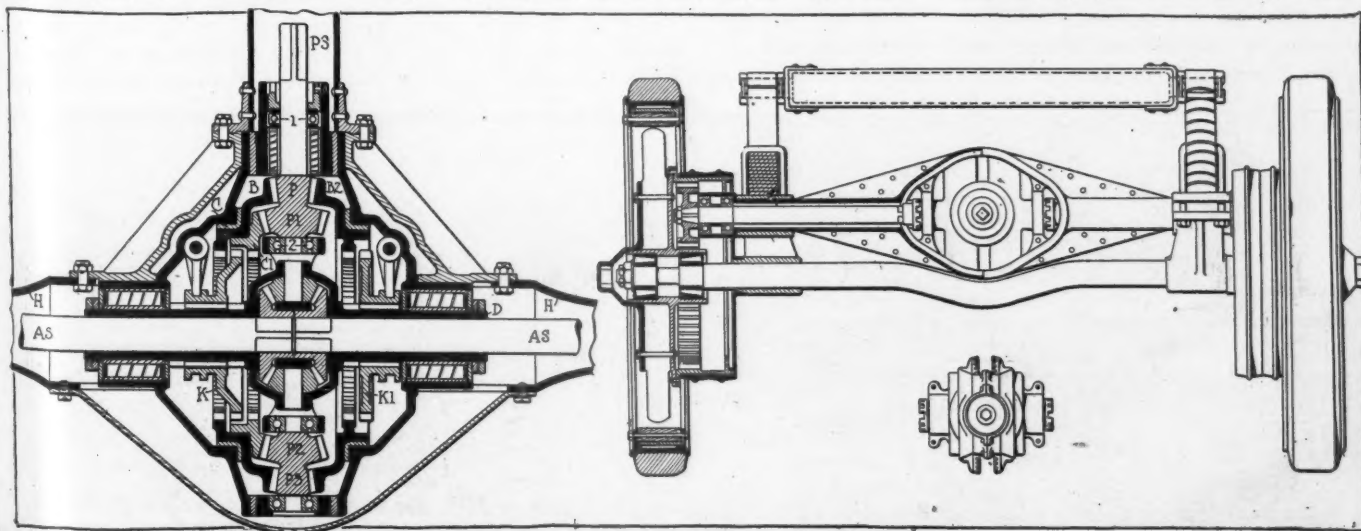


FIG. 18—COLLINS REAR AXLE TRANSMISSION GEARSET, AND INTERNAL GEAR DRIVE CONSTRUCTION

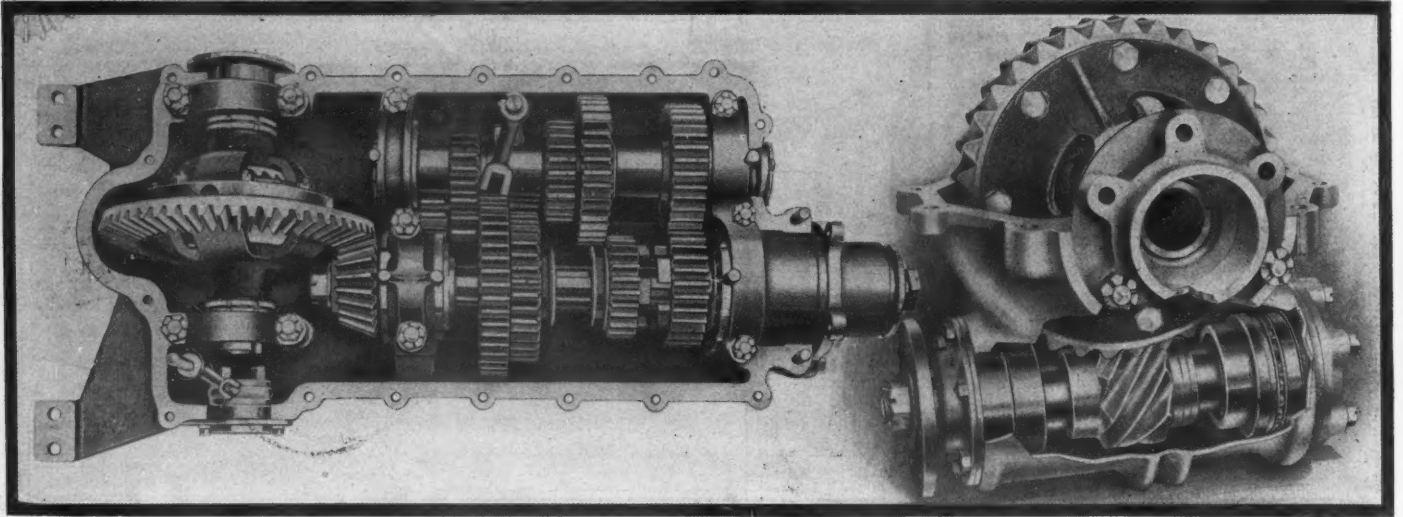


FIG. 1—WARNER GEAR CO.'S NEW COMMERCIAL VEHICLE GEARSET AND LANCHESTER WORM-DRIVE DIFFERENTIAL UNIT

and work in lubricant, and on absolutely fixed centers maintain in perfect pitch and parallelism, under any conditions to which they are subjected in service. The bearings throughout in both the jackshaft and hubs are of the parallel roller or ball type as preferred, and the load capacity of each bearing is much in excess of actual requirements.

It is of special interest to note that the main speed reduction takes place directly at the hubs of the driving wheels so that the rotative speed of the engine is but little reduced till it reaches the hubs of the driving wheels, which permits of the use of a jackshaft having bevel driving gears, differential, casing, etc., considerably smaller and lighter in weight than the ordinary jackshaft in use with the chain drive. Brakes are of very large diameter and surface. They are of the external contracting and internal expanding type, both operating on the same drum. No braking strains are transmitted through the gearing, so that no matter how suddenly and carelessly they may be applied no damage can occur to the transmission mechanism.

Liggett—Solid drop forged front and rear axles are a feature of the Liggett Spring and Axle Co.'s line for 1912. This company makes I-beam and square axles for both pleasure and commercial vehicles

and also I-beam and square rear axles for chain-driven vehicles complete with hubs, roller bearings, brakes, sprockets and strut rods. The company also makes a rear shaft drive axle of the floating type which, like all Liggett axles, is equipped with roller bearings.

Ross Differentials—Spur gear differential mechanisms are a feature of the Ross Gear and Tool Co.'s line of motor car axle equipment. These differentials are of the bevel gear type, with the gears made of $3\frac{1}{2}$ per cent electric furnace nickel steel. The gears inside the differential housing are bushed on hard bronze bushings. Both the pins supporting the differential pinions and the bolts holding the differential together are of nickel steel.

Stutz—The Stutz Auto Parts Co. manufactures rear transmission systems, comprising a unit propellor shaft, torsion tube, selective sliding transmission gearset, and semi-floating rear axle. The transmission housing is of cast aluminum and both the transmission and the greater part of the driving and differential gear housing is cast in one unit. This not only affords great rigidity, but allows all machining to be done by one jigging, which insures all bearing seats being machined in perfect alignment. The whole system is double trussed to withstand severe road shocks. New Departure ball bearings of

liberal size are used throughout the transmission gearset and the driving gear unit also is mounted upon them. The propellor shaft runs on Hyatt roller bearings. The differential gear is of the bevel type with large coarse pitch gears and internal mechanisms which are protected from dirt and water, and designed to run in an oil bath. Grease cups are freely used on all outside moving parts. This equipment is made in two sizes, one designated type A for cars of 25 horsepower and under, and the other type B for vehicles of 40 horsepower and under. In order to meet a commercial demand in the field the company makes both of these types for jackshaft purposes. **B & L Caster Front Axle**—The Queen Mfg. Co.'s axle differs radically from the ordinary design of front axle, in that the king bolt on which the steering knuckle is pivoted, is placed $\frac{3}{8}$ of an inch forward of the center of the wheel hub, instead of $3\frac{1}{2}$ inches to one side of the hub center. The advantages claimed for this construction over those of the older designs now in most general use include easier steering, better control, much less liability of the spindle being broken, one-quarter less space required in which to turn the car around, wheels turn on a perfect pivot, control just as easy on sandy or muddy roads as on smooth highway, and other advantages of this nature.

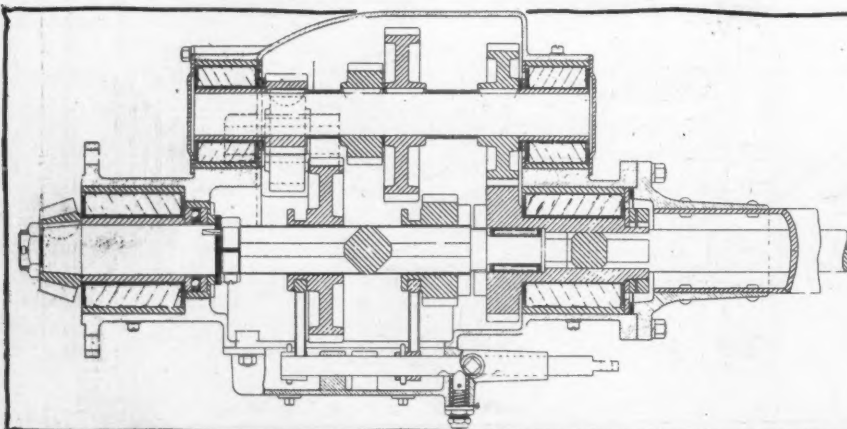


FIG. 2—COVERT TRANSMISSION GEARSET

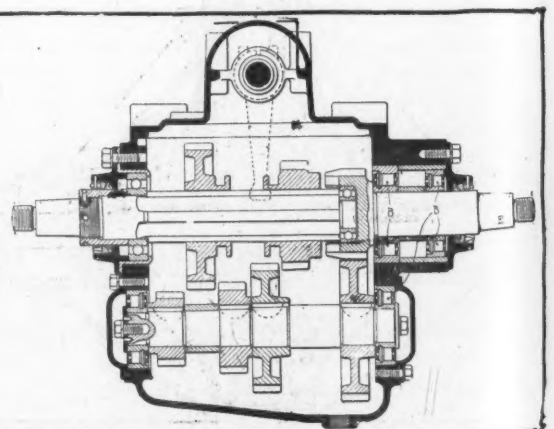


FIG. 3—BUDA GEARSET

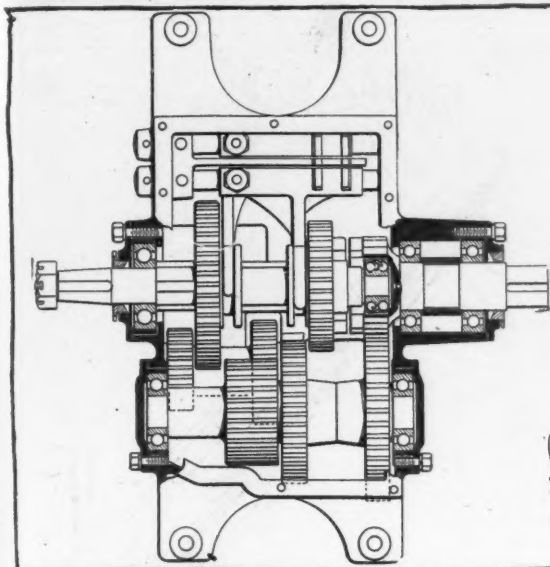


FIG. 4—A WARNER MFG. CO. GEARSET

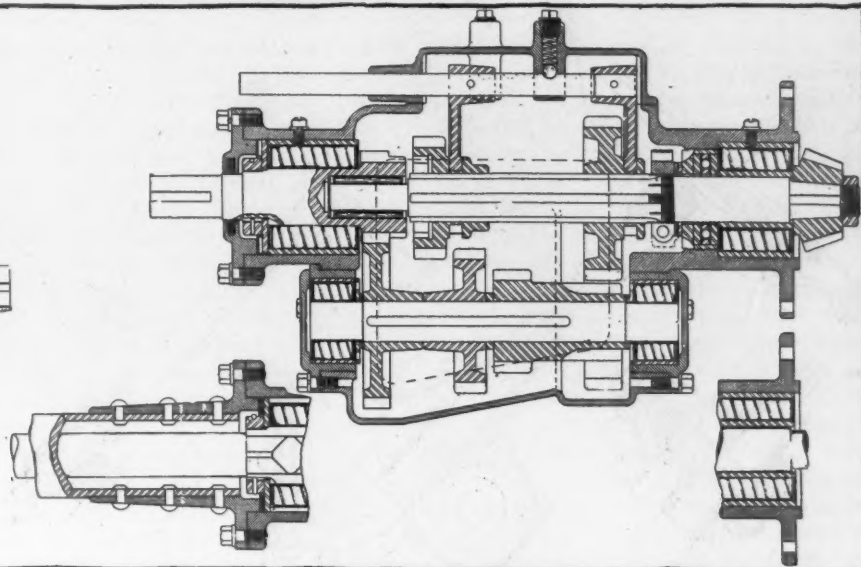


FIG. 5—TRANSMISSION GEARSET OF MUNCIE GEAR WORKS

Styles in Gearset Design for 1912 Season

AS for the development in gearset transmission design the popularity of unit construction has led makers to bring out mechanism attached or adapted for attachment to motors, jackshafts and rear axles. Center control also seems to have become very popular as most manufacturers have brought out gearsets with center control levers mounted upon them.

Brown-Lipe—Transmission gearsets of different types, steering mechanisms, both of up-to-date design and construction, are the principal products of the Brown-Lipe Gear Co. for 1912. Brown-Lipe gearsets are contained in an aluminum case; annular ball or roller bearings are fitted; nicked steel gears are used; and they are adaptable for left or right side, or center control. A unit clutch and gearset is a feature of the line for 1912.

Cotta Transmission—The Cotta Transmission mechanism differs from the ordinary type of change gear in that the gears are allowed to remain in mesh at all times; jaw clutches or dogs being provided on the face of each of the speed-changing gears which are loosely journaled on the

driven shaft and two corresponding double ended sliding clutches mounted on square portions of the driven shaft being employed to effect the connections.

Merchant & Evans—The Evans transmission jackshaft which gives three forward speeds and reverse with direct drive on the two highest speeds is a product of Merchant & Evans Co., whose principle product is the Hele-Shaw clutch. Another feature is the M & E new chain case jackshaft transmission complete. This assembly is furnished for truck jackshafts in which the Evans transmission is employed.

Warner Mfg. Co.—The feature of the Warner Mfg. Co. line of gearsets for 1912 is the model 31 which is especially adapted for commercial car purposes. This transmission gearset has unusually large diameter gears which are cut five pitch. The steel used is chrome vanadium which is heat treated three different times to obtain the utmost strength and toughness. Imported annular ball bearings are used throughout in this gearset.

A. O. Smith Co.—This company makes a selective, three-speed transmission gear-

set for cars of 25 to 50 horsepower. The use of carefully treated steels and imported annular ball bearing are features of A. O. Smith gearset construction.

Covert—The Covert selective type transmission gearsets are the chief product of the Covert Motor Vehicle Co. The distinctive Covert type comprises a gearset with a torsion tube and propeller shaft bolted to the forward end of it, and a flange and bevel driving pinion at the opposite end adapting it for connection to a rear axle or jackshaft.

Buda—Buda transmission gearsets are made in several designs all of which are contained in cast aluminum cases. These cases are designed for three or four-point suspension and facilities are provided for converting them for left or right or center control.

Warner Gear Co.—Transmission mechanisms for pleasure cars, taxicabs and commercial vehicles of either the selective sliding or planetary type, with or without clutch and brake connections, are included in the Warner Gear Co.'s line for 1912.

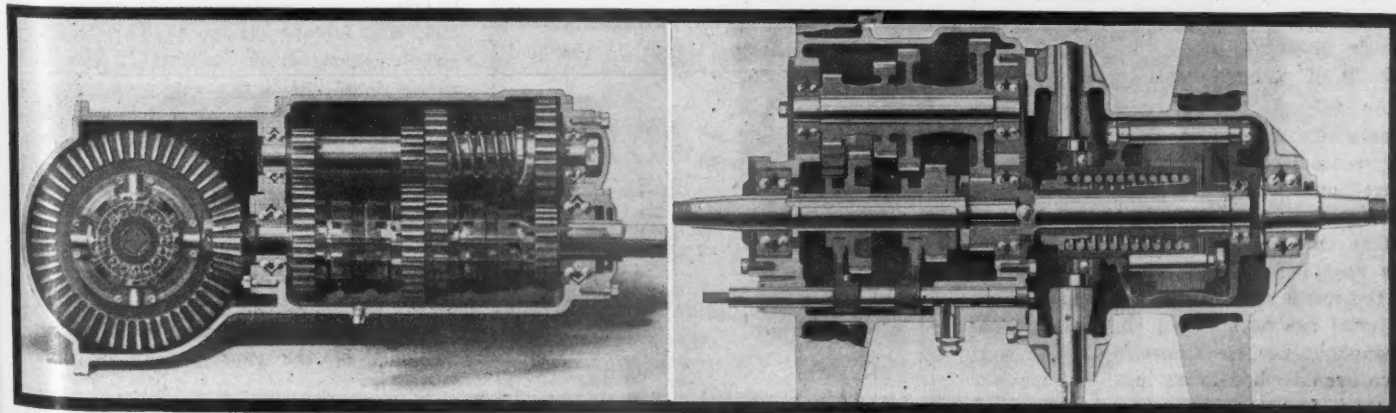
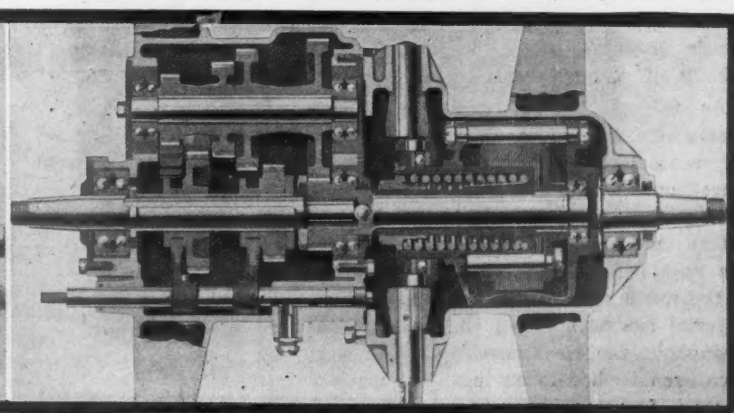


FIG. 6—COTTA TRANSMISSION IN UNIT WITH DIFFERENTIAL



DRIGGS-SEABURY CLUTCH AND BODY TRANSMISSION

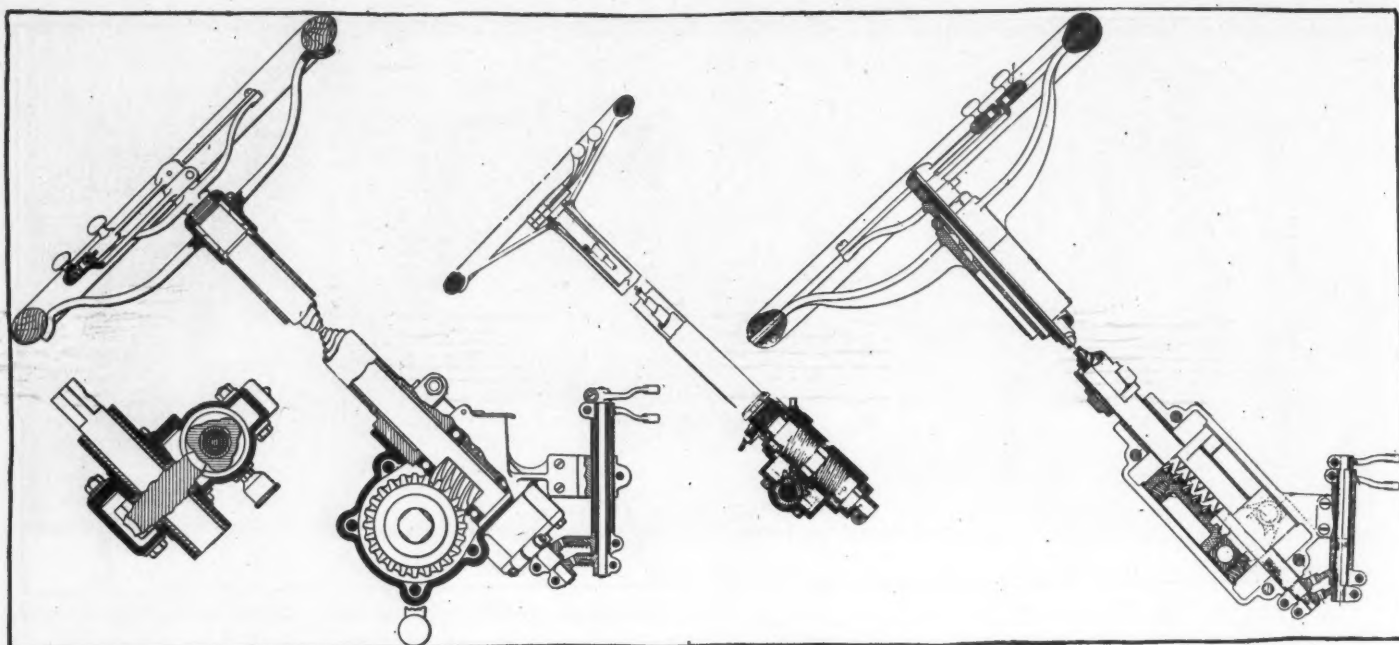


FIG. 1—THE GEMMER MODEL K STEERING GEAR THE BARNES WORM AND SECTOR THE LAVIGNE STEERING MECHANISM

No Radical Change in Steering Gears

REFINEMENTS in design and construction, made possible by the development of better or more adaptable materials, and by improvements in manufacturing facilities that another year's experience has wrought, are practically the only changes in steering gears for 1912. Considerable attention, however, has been given toward the provision of adequate adjustments.

Gemmer—The model K worm gear shown in Fig. 1, might be called the feature of the Gemmer line of steering mechanisms for 1912, though the company also makes an adjustable worm and nut type and several styles similar to the model K. The model K steering gear has a malleable iron housing; the worm is made of hardened steel with its bearing surfaces ground to size; the worm wheel is of hardened steel forged integral with its shaft, and its bearings are ground to size; and the lever or steering arm is of heat treated carbon steel. Shaft bushings and the adjusting nut are of bronze; the jacket tube is made from seamless brass, or brass, steel lined inside, in the 1¾ and 2-inch diameters; and the main column tube is of seamless steel.

As for the improvements that have been made in this mechanism for the coming season: Bronze washers have been placed on either side of the worm wheel, giving better wearing qualities and eliminating end play. A bronze bushing also has been fitted to the end of lower part of the worm shaft. An improved bushing material has been found and now is used throughout the mechanism. Control rods have been bushed in an ingenious manner at three points to prevent whipping and rattling. There is a ground bearing at the

Study of Product Shows Only Refinement in Design and Construction Made Possible by Improvements in Manufacturing Facilities

top of the steering column to insure accurate fitting of the main column tube in the jacket tube and prevent rattling. Oil caps are provided for the lubrication of the bearings at the top of the column. Spark and throttle levers are made of a polished nickel alloy that withstands wear better than nicked brass; and 90-degree sectors are supplied if desired, in various lengths to care for different wheel sizes. A new type of steering wheel is fitted which has a new design of spider of channel section; the metal rim of the wheel is entirely encased in the wood portion; and the wood employed may be either walnut or mahogany with finger corrugations. Most of these improvements are to be found on all models, and in the model

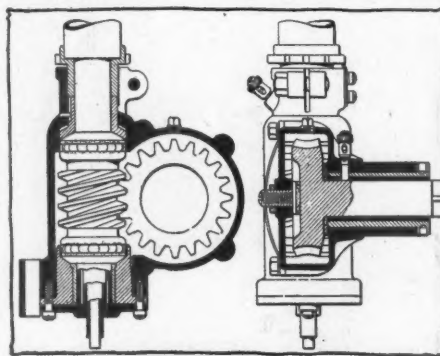


FIG. 2—WARNER WORM AND GEAR

O, an unusually large and convenient oil filler cap is fitted to encourage lubrication.

Jacox—The Jackson Church, Wilcox Co. is manufacturing steering gears of the screw and half nut type which are known to the trade as the Jacox or J. C. W. gears. The feature of this gear is the large thread area of wearing surface that it has. This area amounting to from 3.388 inches to 5.498 square inches, according to the size of the gear, and it is claimed that by its construction sufficient strength is insured to stand five times the strain for which the gear is designed.

Ross—The Ross Gear and Tool Co. makes two models of steering gears for commercial cars. The model B B is for use on 2-ton trucks and the model B F for 3 and 5-ton trucks. The improvements on these gears for 1912 are principally refinements of design. In these two gears high carbon nickel steel is being used; the arms are heat treated, and the feathers on the arm are ground. The ball on the end of the steering rod is separate from the arm and is made of low carbon 3½ per cent nickel steel and is case hardened. This is a desirable construction in that if the ball should wear flat it can easily be replaced cheaply. On the other hand it is much less liable to become flat owing to the case hardening. With this construction, the steering arm is not only stronger by means of the nickel steel and the hardening, but the ground contact surfaces give much smoother action and make a closer fit possible. One of the principal features of this mechanism is that the housing is a working part of the gear instead of being merely a casing to keep the dirt out of the working parts. It is difficult to show the operation of the Ross steering gear by

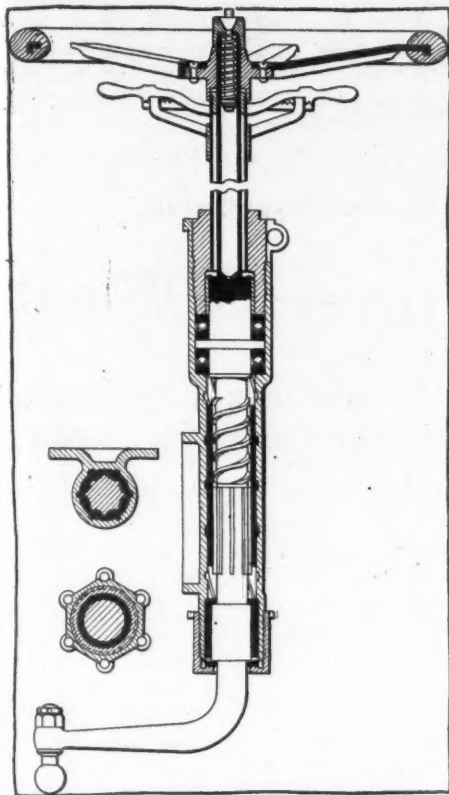


FIG. 3—ROSS STEERING GEAR

means of the ordinary sectional illustration, as shown in Fig. 3, the steering wheel is tapered and keyed to the tube. The lower end of the tube is brazed to a steel screw, which, when turned by the wheel gives a phosphor bronze sleeve longitudinal motion. The phosphor bronze sleeve which is threaded to receive the screw, has spirals on its external surface. These spirals have a very long or rank lead in comparison to the threads on the steel screw. The malleable iron housing has spirals on its interior which engage the spirals on the phosphor bronze sleeve. Therefore, when the phosphor bronze sleeve is given longitudinal motion by the steel screw, it also is given rotative motion by the spirals on its exterior. The phosphor bronze sleeve in addition to being interiorly threaded, contains a number of straight internal keyways. The lower steering arm which projects half way up into the gear, has keys milled on its surface which fit the keyways within the phosphor bronze sleeve so that when the sleeve is given rotative and longitudinal motion it operates the steering arm. The difference in pitch of the steel screw and the phosphor bronze sleeve, causes the gears to be irreversible in its action.

Warner—Inasmuch as both the Warner Gear Co. and the Warner Mfg. Co. both make steering gears which are almost identical in design, the following description and illustration will cover both.

The Warner Mfg. Co.'s steering gear, model 14 A, is one of the many types manufactured by this company though all are of the same general construction. The

malleable housing has a machined portion designed to be clamped by a suitable bracket riveted to the frame and allows the column to be adjusted to any desired angle. The worm gear is a complete gear and allows the worm to mesh with it in four distinct positions whenever extreme wear on the teeth makes it necessary. The worm gear shaft is integral with the gear. It is hardened and ground and mounted in an eccentric sleeve which can readily be adjusted to take up wear in the teeth. The worm is hardened and provided with ball thrust bearings at both ends, any lost motion can be taken up by an adjusting nut at the top of the housing.

Lavigne—One of the features of the Lavigne Mfg. Co.'s line is the Lavigne double leverage push-and-pull steering gear. In this mechanism the operation of the steering arm is obtained by two operating slides threaded right and left. In these slides there is a slot, illustrated in dotted lines, showing two square blocks which encircle two trunnions. These trunnions are part of the rocker arm which operates the steering lever. It will be noticed, that these trunnions are on either side of the rocking shafts, and it also will be noticed that this eliminates any ball thrust bearing and adjusting nut for same. This construction enables this gear to have unusual leverage. The wearing contact of the screw threaded shaft is $6\frac{1}{4}$ inches of actual surface in contact at all times. The wear of the gear is taken up automatically by two gibb shoes provided with springs. The gearcase is constructed of malleable iron castings, the sliding blocks of bronze, the trunnions blocks of steel, hardened and ground, the rocker shaft of a drop forging of special steel hardened and ground, and the take-up gibbs are of soft steel hardened and lapped into place.

Brown—Brown's patent steering gear, which is made by the Baldwin Chain and

Mfg. Co., is shown in Fig. 4. In this illustration the cover is removed, showing the working parts in a neutral position; D is the casing or housing, which is secured to the chassis or subframe. The casing cover forms a bearing for the ball lever shaft A; C is the eccentric piece revoluble in the casing through an angle of 160 degrees; the check pieces B revolve in and with the eccentric piece C, while A is the ball lever shaft to which is secured the usual ball lever. The eccentric piece C is operated through a gear and pinion shown in mesh at the base of the steering post. As the steering wheel is revolved either to right or left a corresponding movement is given to the eccentric cheek pieces B. These cheek pieces contact with the projection shown on the ball lever shaft A, and it follows that any movement of the hand wheel will give a relative motion to the lever shaft; and as the ball lever is secured to this shaft motion is transferred through the usual connections to the front wheels.

Barnes—In the Barnes steering gears the steering mast or post penetrates the adjusting screw and terminates in the lower set of ball races, which gives a very long and durable bearing. The worm nut is one piece of forged steel, hardened, carrying a 9 pitch rack on one side, with a right-hand triple thread running through its entire length, and with a center portion of the threads removed by a counter-bore. On the opposite side from the rack a square cut spline, the length of the nut, runs in a recess way in the housing, which forms a check against radial movement and holds the nut in perfect alignment. The two worms are identical in construction, made of machined steel and case hardened; both have key ways and are splined on the shaft. The lower worm also is riveted to the post, which prevents any longitudinal movement.

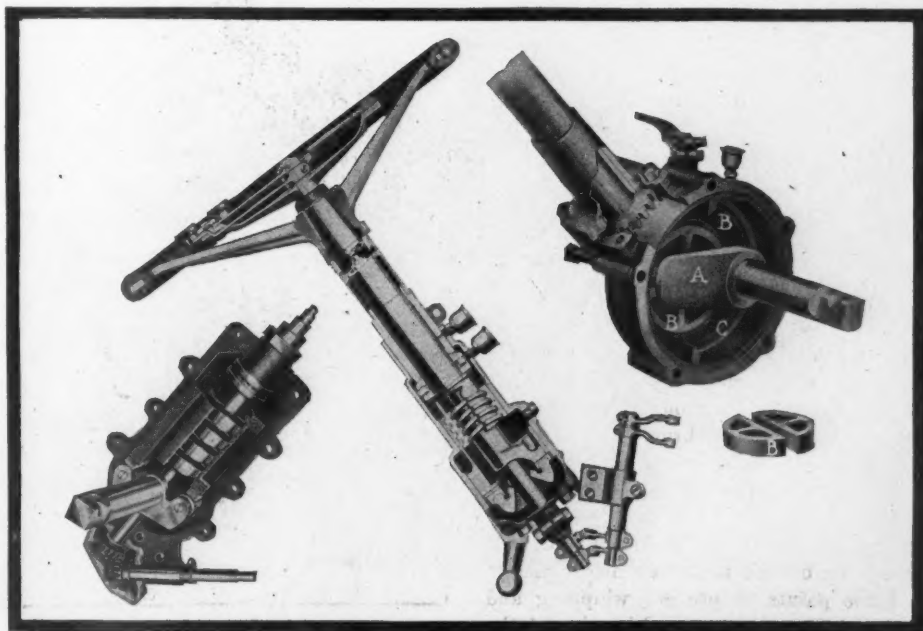


FIG. 4—THE JACOX

MODEL C GEMMER

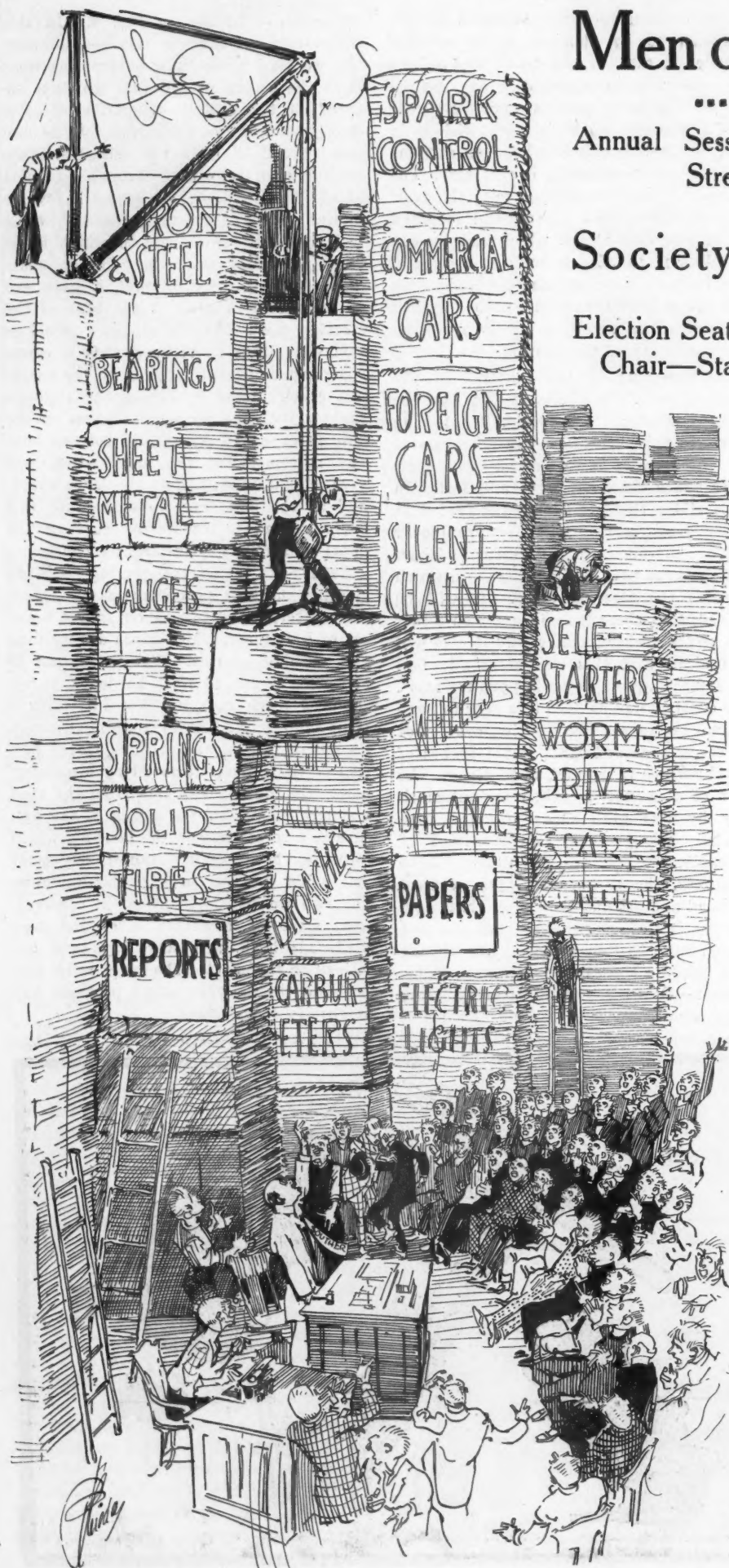
BROWN'S PATENT GEAR

Men of S. A. E. Meet

Annual Session in New York Develops the Strength of the Organization

Society Proves Its Worth

Election Seats H. F. Donaldson in Presidential Chair—Standardization Committees Report



THE S. A. E. WINTER SESSION OPENS AUSPICIOUSLY IN NEW YORK

NEW YORK, Jan. 20—The annual 3-day meeting of the Society of Automobile Engineers, held Thursday, Friday and Saturday of this week, came to a close this afternoon, and was voted by the 350 or more members who registered as one of the important sessions of the society. By general consent the last 3 days of the commercial show in Madison garden had been selected the best time for the meeting, particularly in view of the fact that the sessions were to be held in the garden concert room. Now that the meeting is over it is questionable if the dates selected were the best. In fact, it is the general opinion that earlier in the week would have been much more desirable. As it was, scores of the engineers who were present at the pleasure car show were unable to wait until the end of the commercial car exposition. This proved a considerable loss to the society, so far as attendance was concerned.

Election of Officers

As at former annual meetings, the election of officers took place, resulting in Henry F. Donaldson as president for the coming year; H. W. Alden as first vice-president; H. L. Pope, second vice-president; H. F. Cuntz, treasurer; and C. B. Whittelsey, A. B. Cummer, and A. L. Riker as counsel members to serve for 2 years. Coker F. Clarkson remains as general manager, his work during the past 2 years being most satisfactory, and it is largely due to his efforts that the society is in the unanticipated prosperous condition that it is today.

Treasurer A. H. Whiting in his report covering the last 3 months of 1911 showed that the receipts were \$11,383.14 and the expenditures \$9,350.46. This balance, together with the balance on October 1, leaves the society with a credit of \$2,300 at the present time. The retiring president, Henry Souther, in his annual message told of the growth of the society in the last year from 614 members January, 1911, to 1,200, at present. He drew attention to the necessity of research work on the part of the members, the deductions to be for the general welfare of the society and its members. He urged the necessity of a society laboratory which

would facilitate this department of the work. In his address, which is given in detail on other pages of this issue, President Souther drew attention to the stalwart results which have been accomplished by the general committee on standardization and also by the ten or more subcommittees which are working on standardization of different car parts.

Dinner at the Astor

The professional sessions were relieved Friday evening by the annual dinner of the society held at Hotel Astor, at which more than 330 members and guests attended. This number is slightly in excess of that at the dinner a year ago. Had this social function been held earlier in the week it is certain that upwards of 500 would have been present. The dinner was a great improvement over those of previous years in that addresses followed the menu in place of the vaudeville of previous years.

The professional sessions, of which there were seven, began promptly at 9:30 Thursday morning. They continued morning, afternoon and evening until adjournment, Saturday afternoon. For the convenience of the reader the professional reports are divided into four main divisions without respect to the different sessions at which the papers and discussions were presented. One division covers papers of general technical interest, with discussions. Some of these papers will be published in detail in later issues. The second division deals with the work of the standards committees and their recommendations. For the convenience of the trade the complete specifications on steels are given, also the specifications in the sheet metal divisions. The third division relates to all papers and standards committees recommendations with reference to commercial vehicles. In a fourth divi-



UNEASY IS THE HEAD THAT WEARS A CROWN

sion is printed in detail the president's message. The fifth department might be added, namely, that of the annual banquet.

The present session was characterized from start to finish with open-hearted discussions by many of the members. In the early days of the society, when a paper was read, it was impossible to get discussions started. The members seemed afraid of the sounds of their own voices. Today this is changed, and now it would seem that some of the members are specially anxious of seeing how often their names will appear in the reports of the session.

Many of the discussions were more or less vitriolic and at times flavored with trade relationships. A few of the members cannot lose the opportunity of confining their views to the merits of the accessories or cars in which they are interested.

By far the most important department of the work was that of the standards committee already referred to. While the papers on timely topics of car construction were interesting, many of them did not contain the research information that makes them of practical value to the engineer. They were frequently a review of present conditions.



ANNUAL DINNER OF SOCIETY OF AUTOMOBILE ENGINEERS AT NEW YORK

S. A. E. Selects Steel Specifications

NEW YORK, Jan. 18.—One of the most interesting features of the present session of the S. A. E. and one feature which has been a troublesome matter since the work of the standardization committee began is that of specifications of the different steels, such as carbon, nickel, chrome-nickel, chrome-vanadium and valve steels. President Souther, as chairman of the standards committee submitted the third report of the alloy steel division, part of which is published on these pages, that part relating chiefly to the specifications of the different steels. The necessary heat treatment for these steels, as outlined in the report, has been omitted for lack of space. The object of this report is to give to the engineer, whether designing cars or accessories, a valuable list of specifications of necessary steels, specifications which will give very satisfactory results and heat treatments which are satisfactory for such materials. Prolonged discussion took place, but the report was finally adopted unanimously.

Importance of Souther's Report

When the chairman finished reading the report, President-elect Donaldson having been called to the chair, it seemed as if it was about to be adopted without discussion, but gradually the membership woke up to the importance of the report and for over 1 hour a continuous fire of remarks, comments and explanations enlivened the proceedings.

Professor F. R. Hutton commenced the battle by suggesting that the report be accepted by the society, pointing out that President Souther had explained that the report did not represent the final word in the work of the society along this line, but rather was a long step in a continuous progress along the way toward perfection.

George F. Fuller really fired the big gun of the campaign when he took the platform and said that he endorsed the work of the committee as far as it had gone. He said that it had only made a good start and called attention to the fact that a most important point had been overlooked.

He said that the chief end to be accomplished by the formulation of steel specifications was to make more certain the attainment of the wishes of purchasing engineers by aiding them in the selection of appropriate metals, and yet, he said, all the specifications in the world would do no great good unless there were some means to insure getting the material specified. He declared that the physical properties were the real requirement and that chemical composition, no matter how important, was not to be considered in the same light as satisfactory physical properties.

"If there is no effort made to determine

Third Report of Iron and Steel Division Contains Improved System of Nomenclature for Steel Specifications — Report Includes Specifications for Various Alloy Steels

the characteristics of steel delivered under certain sets of specifications," said Mr. Fuller, "there is no telling what manner of steel is delivered."

"I recommend that from 5 to 10 per cent, of any particular shipment of steel should be used in determining the characteristics of the remainder of the shipment."

Mr. Souther explained that the tests from which the data book had been compiled were based upon sectional specimens ranging from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter. He then went on to say that the elastic limit of crankshaft steel ought to be 70,000 pounds to be good and that 90,000 pounds was certainly good. He outlined an ideal condition where all that would be necessary in ordering special steel for crankshafts, for instance, would be for the engineer to purchase, say, 3 per cent nickel-steel with an elastic limit of 90,000 pounds.

In telling some of the details of testing steel, Mr. Souther said that the practice of drawing a coupon of steel $\frac{1}{4}$ inch in diameter from the end of a forging and using it as a basis of test for the whole forging was manifestly unfair. He also said that a sample taken from the center of the forging would not represent the true characteristics of the metal, because the center of such a forging as a crankshaft does little actual work and therefore the material is of comparatively small importance. He explained incidentally that a hollow crankshaft would be quite as strong as one of similar material that was solid.

Hours of Discussion

Mr. Souther went on to say that steel of various chemical compositions might be made to attain the same elastic limit and approximate toughness by varying the form of heat treatment and that the difference between the very highest and most expensive grades of steel and ordinary carbon steel could be made apparent in bending tests. He admitted that specifications were not always followed by steel makers and regretted the fact that adequate tests were not always made by purchasers.

Mr. Donaldson suggested that it might

be necessary for him to add a committee on ethics to the standards committee to deal with the enforcement of specifications as developed by the non-observance of them by makers of material. He said, however, that with a set of specifications, the automobile engineers at any rate had something to work on.

W. B. Barba advocated requiring a certificate of physical properties from the makers. In the alternative he said that a prolong should be required on castings so that the specifications could be checked.

"Some companies," said he, "use up from 5 to 10 per cent of their driveshafts in order to prove up on the ordered steel."

Mr. Souther said that companies might order several more forgings than were necessary, if it were deemed advantageous to break up the forgings in order to check up the material. He said that one good test of quality where a certain number of driveshafts had been ordered with elastic limit of 100,000 pounds, was to place several of the shafts in jigs and submit each of them to the full contract pressure. If they stood up, they answered specifications; if they did not, they could be rejected. In addition, he also would require that thorough tests to the contract limits should be made to prove up the required hardness. In this way, he said, there would be no loss through breaking up the forgings for testing.

Discussing Forgings

The question was put to Mr. Souther as to his attitude in passing upon the acceptance or rejection of, say, 5,000 drop forgings because it appears from tests that there was an excess of phosphorus or sulphur over the amount called for in the chemical specifications. Mr. Souther replied that chemists differ, but that .04 per cent of phosphorus was the commercial limit and that any good steel maker is able to approximate it. He said that if the percentage of phosphorus in the product of one maker averages .042 per cent or higher, while that of another is around .02 per cent, the price being equal for each make, the choice would naturally fall upon the maker with the smaller percentage of phosphorus in his product. He said that when considerable purchases of steel are to be made the engineer usually offers his specifications to three or more manufacturers. As a result of their bids the contract is let and it is to be assumed that the bidders have taken into consideration the chemical composition of the steel to be delivered and have made their prices accordingly. Therefore, Mr. Souther said, a material difference between the amount of phosphorus specified and the amount contained in the goods delivered would constitute good grounds for rejection. He explained that the actual difference in the service and quality of the steel, owing to

a minute proportion of phosphorus was small.

"Where, say, .04 per cent is the limit allowed and repeated shipments show as much as .045, the inference is carelessness or worse on the part of the maker," he said.

Can Vary Heat Treatment

Mr. Souther emphasized the importance of proper heat treatment, saying that frequently excellent steel proved unsatisfactory in service and poor steel delivered a satisfactory service through the application of improper and proper heat-treating methods. He summed up by saying that it was the duty of the engineer to let the manufacturer know exactly what was wanted; to demonstrate that such material was delivered and after receiving it, it was the duty of the engineer to see that it was properly heat treated.

J. F. Funk remarked that there was no merit in the idea of leaving an elongation on the crankshaft for testing purposes as

to the composition of the steel. He said there was too much variation in the material at the end of such a forging as compared with the steel midway of the shaft. **Need of Heat Treatment**

Mr. Markley was heard with much attention when he said that it appeared as if the making of steel and the solution of the problem in hand was largely a matter of integrity on the part of the steel makers. He suggested that besides the regular specifications framed by the standards committee, each order should contain the provision: "Each element shall be the best of its kind and satisfactory to us." He remarked that according to manufacturers' certificates two shipments of steel used by his concern contained .04 and .05 per cent of phosphorus respectively, while the test of the same steels in the University of Pennsylvania laboratory showed it to be .04 per cent.

Mr. Souther and Mr. Fuller had a lively

discussion of heat treatments, the former stating that while widely variant steels might be brought to the same elastic limit and degree of toughness, tests frequently proved that one would last ten times as long as another. He cited instances where steels of the same elastic limit, but of different composition were tested, one would prove to be of coarse texture while another was fine. From this he argues that there was a good reason always for selecting the high-grade steel for indicated purposes, as against the coarser grades for the same purposes.

Mr. Fuller contended that when the maker of steel is able to furnish carloads of steel treated to the exact, identical degree of heat, it would be time enough to go deeper into the question of specifications.

Mr. Donaldson interjected a remark that so far in the progress of the art no substitute had been found for engineering judgment by formulating specifications.

Third Report Made by the Iron and Steel Division

THIS report contains specifications for carbon, nickel, chrome-nickel, chrome, chrome-vanadium, silico-manganese, and nickel steels for valves. It also contains instructions for heat treatment of these different steels as well as information on the several steels. The committee consisted of Henry Souther, Chairman, E. F. Russell, S. V. Hunnings, A. R. Gormully, Arthur Holmes, G. E. Franquist, F. W. Trabold, E. L. French, George L. Norris, M. T. Lothrop, K. W. Zimmerschied, Thomas Towne, F. D. Carney, W. P. Barba, Joseph Schaeffers, Coker F. Clarkson, secretary. The report was as follows:

Specification Numbers

A numeral index system has been adopted in the numbering of the metal specifications contained in this report. This system renders it possible to employ specification numerals on shop drawings and blue prints that are partially descriptive of the quality of material covered by such number; for example, to the carbon steels have been assigned the whole number 10, the numbers following the dash indicating the content of carbon; wherefore 10-10 is the specification numeral for .10 carbon steel.

In the case of steels containing nickel, the approximate percentage of nickel is indicated in each case by the first figure to the left of the dash in the various specifications. In the case of the chromium steels and of the chromium vanadium steels, the first figure to the left of the dash indicates approximately the chromium content. In the case of the silico-manganese steel, the corresponding figure indicates the silicon content.

The basic numerals for the various qualities of steels herein specified follow:

Carbon steels.....	10-
Carbon steel, screw stock.....	11-
Carbon steel, castings.....	12-
Nickel steels—3.50 per cent nickel.....	23-
Nickel chromium steels, low nickel.....	31-
Nickel chromium steels medium nickel.....	32-
Nickel chromium steels, high nickel.....	35-
Nickel chromium vanadium steels, low nickel.....	41-
Nickel chromium vanadium steels, medium nickel.....	42-
Chromium steels—1.00 per cent chromium.....	51-
Chromium steels—1.20 per cent chromium.....	52-
Chromium vanadium steels.....	61-
Silico-manganese steel.....	92-
Valve metal—.06 per cent nickel.....	206-
Valve metal—.30 per cent nickel.....	230-

Specifications for iron castings—malleable iron and gray iron—have not been assigned basic numerals in these specifications.

These steels may be of open hearth, crucible or electric manufacture, and must be homogeneous, sound and free from physical defects, such as pipes, seams, heavy scale or scabs and surface and internal defects visible to naked eye.

These steels will be purchased on the basis of chemical analysis. The specifications indicate the desired chemical composition. Any shipments not conforming to these specifications after careful check analysis may be rejected.

Materials to be sampled shall be considered under three classes, namely:

- 1—Wire, tubing, sheet and rod metal less than 1½ inch in size shall be sampled across or through the entire section.
- 2—Forgings or pieces of irregular shape shall be sampled by drilling or cutting at thickest and thinnest sections, or through or across entire section.
- 3—Bars and billets or other shapes above 1½ inch thick shall be drilled at half radius, or half-way between center and exterior surfaces.

CARBON STEELS

SPECIFICATION NO. 10-10

The following composition is desired:

	Per cent	desired
Carbon.....	.05 to .15	.10
Manganese.....	.30 to .60	.45
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-20

The following composition is desired:

	Per cent	desired
Carbon.....	.15 to .25	.20
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-30

The following composition is desired:

	Per cent	desired
Carbon.....	.25 to .35	.30
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-40

The following composition is desired:

	Per cent	desired
Carbon.....	.35 to .45	.40
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-50

The following composition is desired:

	Per cent	desired
Carbon.....	.45 to .55	.50
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-80

The following composition is desired:

	Per cent	desired
Carbon.....	.75 to .90	.80
Manganese.....	.25 to .50	.35
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 10-95

The following composition is desired:

	Per cent	desired
Carbon.....	.90 to 1.05	.95
Manganese.....	.25 to .50	.35
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SCREW STOCK

SPECIFICATION NO. 11-14

The following composition is desired:

	Per cent	desired
Carbon.....	.08 to .20	.20
Manganese.....	.30 to .80	.80
Phosphorus, not to exceed....	.12	
*Sulphur.....	.06 to .12	

STEEL CASTINGS

SPECIFICATION NO. 12-35

The following composition is desired:

	Per cent	desired
Carbon.....	.30 to .40	.35
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.05	

*Sulphur, not to exceed.....	.10 to .05
Silicon.....	.10 to .30

NICKEL STEELS

SPECIFICATION NO. 23-15

.15 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.10 to .20	.15
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-20

.20 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.15 to .25	.20
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-25

.25 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.20 to .30	.25
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-30

.30 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.25 to .35	.30
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-35

.35 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.30 to .40	.35
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-40

.40 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.35 to .45	.40
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-45

.45 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.40 to .50	.45
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

SPECIFICATION NO. 23-50

.50 Carbon, 3¼ Per Cent Nickel Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.45 to .55	.50
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

NICKEL CHROMIUM STEELS

Low Nickel Chromium Steels

SPECIFICATION NO. 31-15

.15 Carbon Low Nickel Chromium Steel

The following composition is desired:

	Per cent	desired
Carbon.....	.10 to .20	.15
Manganese.....	.50 to .80	.65
Phosphorus, not to exceed....	.04	
*Sulphur, not to exceed.....	.04	

* By gravimetric (aqua regia) method of oxidation.

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-20

.20 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon15 to .25 .20
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-25

.25 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon20 to .30 .25
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-30

.30 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon25 to .35 .30
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-35

.35 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon30 to .40 .35
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-40

.40 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon35 to .45 .40
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-45

.45 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon40 to .50 .45
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

SPECIFICATION NO. 31-50

.50 Carbon, Low Nickel Chromium Steel

The following composition is desired:

Carbon45 to .55 .50
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.00 to 1.50
Chromium30 to .75

Medium Nickel Chromium Steels

SPECIFICATION NO. 32-15

.15 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon10 to .20 .15
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 .75

SPECIFICATION NO. 32-20

.20 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon15 to .25 .20
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-25

.25 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon20 to .30 .25
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-30

.30 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon25 to .35 .30
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-35

.35 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon30 to .40 .35
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-40

.40 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon35 to .45 .40
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-45

.45 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon40 to .50 .45
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

SPECIFICATION NO. 32-50

.50 Carbon, Medium Nickel Chromium Steel

The following composition is desired:

Carbon45 to .55 .50
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 1.50 to 2.00 1.75
Chromium75 to 1.25 1.00

High Nickel Chromium Steels

SPECIFICATION NO. 33-15

.15 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon10 to .20 .15
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-20

.20 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon15 to .25 .20
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-25

.25 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon20 to .30 .25
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-30

.30 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon25 to .35 .30
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-35

.35 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon30 to .40 .35
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-40

.40 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon35 to .45 .40
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

SPECIFICATION NO. 33-45

.45 Carbon, High Nickel Chromium Steel

The following composition is desired:

Carbon40 to .50 .45
Manganese30 to .60 .45
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Nickel 3.25 to 3.75 3.50
Chromium 1.25 to 1.75 1.50

NICKEL CHROMIUM VANADIUM STEELS

SPECIFICATIONS 41— AND 42—
Attention is called to the fact that there is already in use a new series of steels corresponding to the class of specifications 31— and 32—, but with the addition of vanadium (the proportions of the other elements remaining unchanged). The amount of vanadium to be specified should be "not less than .12 per cent (.18 per cent desired)." As in the case of the chromium vanadium steels of class 60—, herein specified, the effect of this vanadium content is to increase the elastic limit without appreciably reducing the ductility. The vanadium also increases the fatigue-resisting (endurance) qualities of the steels.

CHROMIUM STEELS

SPECIFICATION NO. 51-95

.95 Carbon, 1 Per Cent Chromium Steel

The following composition is desired:

Carbon90 to 1.05 .95
Manganese20 to .45 .45
Phosphorus, not to exceed.... .03
Sulphur, not to exceed..... .03

Chromium90 to 1.10 1.00

SPECIFICATION NO. 51-120

1.20 Carbon, 1 Per Cent Chromium Steel

The following composition is desired:

Carbon 1.10 to 1.30 1.20
Manganese20 to .45 .45
Phosphorus, not to exceed.... .03
Sulphur, not to exceed..... .03

Chromium90 to 1.10 1.00

SPECIFICATION NO. 52-95

.95 Carbon, 1.20 Chromium Steel

The following composition is desired:

Carbon90 to 1.05 .95
Manganese20 to .45 .45
Phosphorus, not to exceed.... .03
Sulphur, not to exceed..... .03

Chromium 1.10 to 1.30 1.20

SPECIFICATION NO. 52-120

1.20 Carbon, 1.10 Chromium Steel

The following composition is desired:

Carbon 1.10 to 1.30 1.20
Manganese20 to .45 .45
Phosphorus, not to exceed.... .03
Sulphur, not to exceed..... .03

Chromium 1.10 to 1.30 1.20

CHROMIUM VANADIUM STEELS

SPECIFICATION NO. 61-15

.15 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon10 to .20 .15
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04

*Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-20

.20 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon15 to .25 .20
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-25

.25 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon20 to .30 .25
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-30

.30 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon25 to .35 .30
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-35

.35 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon30 to .40 .35
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-40

.40 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon35 to .45 .40
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-45

.45 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon40 to .50 .45
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-50

.50 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon45 to .55 .50
Manganese50 to .80 .65
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

Chromium70 to 1.10 .90
Vanadium, not less than..... .12 .18

SPECIFICATION NO. 61-95

.95 Carbon, Chromium Vanadium Steel

The following composition is desired:

Carbon90 to 1.05 .95
Manganese20 to .45 .45
Phosphorus, not to exceed.... .03
Sulphur, not to exceed..... .03

Chromium90 to 1.10 1.00
Vanadium, not less than..... .12 .18

SILICO-MANGANESE STEEL

SPECIFICATION NO. 92-50

Silico-Manganese Steel

The following composition is desired:

Carbon45 to .55 .50
Manganese50 to .80 .65
Silicon 1.50 to 2.00 1.75
Phosphorus, not to exceed.... .04
Sulphur, not to exceed..... .04

VALVE METALS

SPECIFICATION NO. 296—

Valve Metal No. 1

To contain not less than 96 per cent of nickel.

This material shall be malleable.

SPECIFICATION NO. 230—

Valve Metal No. 2

This metal shall contain:

Carbon, not over..... .50
Manganese, not over..... 1.50
Phosphorus, not over..... .04
Sulphur, not over..... .04

Nickel 28.00 to 35.00

The remainder to be iron.

Note—*By gravimetric (Aqua Regia) method, by oxidation.

IRON CASTINGS

Gray Iron Castings

Total carbon 3.00 to 3.50

Combined carbon40 to .70 .60

Manganese40 to .70 .50

Phosphorus60 to 1.00

Sulphur, not to exceed..... .10

Silicon 1.75 to 2.25 2.00

Malleable Iron

President Souther's Annual Message

THIS meeting opens the eighth annual convention of the society. It becomes my duty to make a brief statement as to the situation in the various fields of action in which the society has been interested during the past year.

The council believes that the winter meeting should be held at this time, while many of the members are in the city attending the truck show. The idea has been favorably commented upon by some, and unfavorably by others. One group feels that the meeting necessitates two trips to New York, because they cannot stay the whole 2 weeks of the show or any great part thereof. Others feel that they are here for the entire show anyway and, consequently, that it is a most opportune time for the meeting. In any event, a free expression of opinion from the membership is sought, with the idea that the opinions may help the council in selecting a date next year that will suit the greatest number.

The membership has increased steadily during the past year. In June, 1910, we had 310 members; in January, 1911, we had 614; in June, 1911, we had 899 and at the present time we have a membership of 1,200. These figures include membership of all grades, full members, associates and juniors. We also have a few affiliate members, that is, corporations who have joined since the constitutional amendment providing for such grade was passed last June.

Increase in Membership

There has been some comment that our society is increasing its membership too rapidly and admitting every one promiscuously. I feel that those who are of this opinion do not fully appreciate the scope of the work being undertaken by the society. Possibly the name of the society is misleading in this respect; that is, that it is a society of motor car engineers pure and simple. The term engineer strictly interpreted means one who has been educated in an engineering school or who has acquired engineering knowledge by experience. To draw a line strictly between one who qualifies in this respect and one who does not is no easy matter, and I believe, for one, that such division is not necessary. What this society is after is results which will increase its engineering knowledge useful to the members and which will help the industry as a whole; therefore, if a man is qualified to help forward any of the numerous branches of our work, then he is qualified for membership in the society. This statement always assumes that the society is going into a broad and practical field of work, and will not limit itself to a strictly theoretical field. If the Society of Automobile Engineers hopes to do as much, for its industry as the Master Car Builders' Association did for the railroad industry, then the membership cannot be confined strictly to simon-pure car engineers. As a matter of fact, there are very few men who can qualify in this strict sense. In other societies as, for example, the American Society of Mechanical Engineers, or the American Institute of Mining Engineers, the membership is made up of not strictly mechanical engineers or mining engineers, but of men who are interested in mechanical and mining matters.

Consequently, it is my opinion, and the opinion of the council and of those most familiar with the possibilities before the society, that the membership is not being increased too rapidly and that the society is not attempting to embrace members whose qualifications are too far from those of the strictly car engineer. It is my opinion that there is room for both classes of effort, that is pure engineering and manufacturing in all their phases.

Prepare Technical Data

It is desirable that the engineers of our society should prepare technical papers and bring about an advance in technical and theoretical knowledge. It is equally desirable that our factory managers, purchasing departments, cost departments, and others, should interest themselves in the affairs of the society. The work of the engineer would be useless without the co-operation of those other branches of the industry; and so would the work of the factory be incomplete without the co-operation of the engineer. Therefore, they should be found together in our society in order to round out its sphere of usefulness.

We have been fortunate in getting from our members several contributions of value of a strictly engineering character. We have been disappointed in not getting some that were promised. There is an endless field of subjects in this industry which require engineering consideration and study. To prepare papers on such subjects, however, means that original research work must be done by some one. Research work is slow work, requiring considerable time and often money. Here, the co-operation of our manufacturers is urged. Individual members can not be expected to furnish the necessary money to carry on research. On the

other hand, some of the companies interested can well afford to contribute to the welfare of the industry in this way. There are several matters of engineering importance being studied by our members at the present time, and the results will eventually be placed in our hands. With a membership large enough and a corresponding financial strength, it is hoped that some day we may have a research laboratory of our own with perhaps a paid force. That is out of the question at the present time, however, and is only one of the things we must hope for and work for.

Board of Trade Busy

Since our last meeting a technical committee has been appointed by the Automobile Board of Trade. This committee was formed with the idea of doing original work and without any idea of repeating the work that is being done by this society. Such standards as we adopt the Automobile Board of Trade stand ready to endorse, provided, of course, the technical committee approves. They have been invited to suggest providing they do not approve. The work of this committee should be made a valuable one, and it is hoped that in some way or other the work of the society and of the Automobile Board of Trade may be made mutually beneficial.

A number of our members made the trip to England and France during November and part of December. One and all have expressed themselves as being very much elated with the trip, and state that the reception accorded them by our English co-workers was most cordial and elaborate. Our members were permitted to visit English plants that have never before been opened to outsiders. The visits were made a continuous round of entertainment in one form or another. I will make no attempt to go into the matter in detail, as I know that one or more of the members who made the trip will report to you during the present meeting and give us an idea at least of their experiences.

The handbook has made a place for itself and has proven a very practical means of putting before the members the results obtained by the various divisions of the standards committee. It is by no means complete and by no means as valuable as it will be from year to year. The standards adopted will be printed therein as fast as they come through. In this way the data accumulated by our various divisions is immediately available to engineers and draftsmen. This seems to your management an improvement and an addition to the printed transactions that is likely to prove of very great value. There is much printed matter in the transactions that is not needed for easy reference. If the members were required to search the volumes of the transactions for all such data as result from their committee's investigations, it is quite probable that they would soon become discouraged and seek elsewhere for the information. With the handbook, however, and its index, any desired detail may be found in a very few moments. The handbook should be found within easy reach of every engineer and draftsman in the industry. It contains not only the standards adopted by the society, but a segregation of numerous tables and calculations that are useful to the automobile engineer and draftsman. All of the information exists somewhere else in the literature of the industry, but in the handbook data sheets it is brought together in convenient form.

Handbook Information

The results of the practical use of the handbook data sheets are far-reaching. For example, a few isolated parts-makers say that they cannot see how the work of the standards committee can possibly help them any, inasmuch as they are obliged to produce in accordance with the specifications of their customers. This latter is very true. Assume for a moment that their customers are members of the Society of Automobile Engineers and that they are in the habit of using the handbook for reference purposes. The draftsman, in laying out new work, incorporates all of the standards found therein, whether it be tubing sizes, broached holes, bearings or some other item. The drawings go to the parts-maker in question and he suddenly discovers that he has the tubing in stock, or the proper broaches, and so on. His work is immediately simplified and he is able to make a lower bid than he otherwise would be. In this way the work of the standards committee is retroactive. Therefore, every parts-maker should be very much interested in the work of the standards committee; because if the standards adopted are good standards, he will be glad to use them when they are found in the drawings and specifications of his customers.

The makeup of the divisions comprising the standards committee of the Society of Automobile Engineers is as a rule non-partisan; that is to say, the membership is composed in nearly all cases of half producers and half

consumers. This scheme of management has worked out most satisfactorily. Each question is threshed out in committee by those interested in both sides of the question; consequently the work of each division must be the more valuable because it has received the scrutiny of both producer and consumer. This scheme obviates the bad features that are often found in certain specifications of standards sent forth by engineers without consultation in any way with the producers involved. It is due to this fact that numerous specifications issued from other sources have been very impractical and have not made good. I may say that some of them have contained impossible requirements, and in such cases have only excited the ridicule of the producer and his experts. It is believed by your management that the specifications and standards recommended by your standards committee do not possess these faults, for the reasons above given; consequently, it is a safe proposition for any of our members to adopt the S. A. E. specifications in whole or in part, feeling assured that the requirements are practical ones.

The work of the standards committee has progressed as rapidly as is safe. There has been much time given to the work of the various divisions by many members whose time is very valuable. The result of all this labor is beginning to make itself felt. The results still pending on some lines of work are being expectedly awaited by our members and the automobile industry in general. Repeated inquiries have reached me, asking when the work of this or that division will be in shape for printing, so that the results might be applied. All of this is very encouraging to the management of your society and shows that the work under way is worth the doing, provided it be done well.

When the work of the standards committee was first outlined, it seemed that some of the objects sought might never be attained—that it was impossible to standardize certain things. It is very gratifying to be able to report that some of the most difficult things attempted have actually been accomplished and are in effect. Particular reference is made at this time to the standards for truck wheels. Several powerful corporations have made public an announcement to the effect that beginning January 1, 1912, no other truck wheels would be furnished than those conforming to our standards.

New Truck Standards

The truck standards division has been formed since our last meeting. It is important to note that the formation of the division is during the early history of extensive truck manufacture. There is no time so favorable for the adoption of a standard as in the beginning of an industry. During the early history of any industry there is less difficulty in establishing a standard than later, for the simple reason that there is less to undo. A young industry has not set up many standards of its own that it would cost a great deal to change. On the other hand, there is not sufficient data available to establish many standards. Neither engineer nor factory manager knows enough to select that which is just right. Nevertheless, it is apparent that there are some things in connection with truck manufacture that can be standardized now just as well as later, and the function of this division is to establish standards and to continue adding to these standards just as fast as it is safe to do so. To go too fast would be an error; but not to move at all would be a greater error. Your management feels, therefore, that this division is a very important one and asks that the membership realize this fact and will co-operate with it in every possible way.

Although the work of the iron and steel division has not been completed, it is all useful in its incomplete form. As the work of this division progresses, it becomes evident that its work may not be completed for a long time. Progress in the steel industry is rapid and new steels are winning reputations that demand recognition by the division. Nevertheless, it is possible to place before the membership at this time a great deal of information that is valuable and useful, and that will enable purchasing departments to select with some intelligence, materials that are worthy of use.

Steel Tube Standards

Other reports which have been placed before other standardization work in rather complete form, includes standard sizes for seamless steel tubing, and sheet metals, both steel and non-ferrous; the latter contains a great deal of valuable data that cannot be found elsewhere. The report on carburetor pipe flanges and gasoline and water-pipe connections is before you in such shape as to be of practical value; the rod and yoke end standards have been added to by a modified set for those with hardened bushings. The lock washers division, the frames division and the miscellaneous division are all making at this meeting valuable reports.

Reports Made on Standardizing Parts

THE second report of the standard sub-committee on leaf springs was presented. The report deals specifically with the nomenclature of different types of springs, including half-elliptic, three-quarter elliptic, elliptic, three-quarter scroll elliptic, scroll elliptic one end, scroll elliptic both ends, platform, three-quarter elliptic platform and auxiliary springs. The committee recommended widths of spring leaves for pleasure cars, these widths being $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$ and $2\frac{1}{2}$ inches. The standard width for commercial cars recommended are 2, $2\frac{1}{4}$, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4 and $4\frac{1}{2}$. In addition to these sizes a standard for center bolt sizes was recommended. The report also included the necessary specifications that the maker should include when ordering springs. The consideration of the report resulted in more or less entanglement. This subject was a difficult one to standardize, owing to the vast differences in practice. The subject matter was departed from to a certain extent when the members of the society took up the matter of the position of the spring shackles. This discussion was precipitated by H. L. Pope, who stated that there was an error in the illustrations of the reports, as the position of the shackles on some of the springs was shown to be at an angle to the vertical instead of being vertical. David Landau stated that in his opinion the shackle could be ignored and that it made no difference at what load the shackle assumed a vertical position so long as the designer furnished the proper dimensions of the spring to the spring maker. After discussion had tangled itself into an inextricable knot it was decided to accept the report of this division so far as nomenclature and center bolt sizes were concerned.

The Bearing Report

Chairman David Fergusson presented the third report of the sub-standards committee on ball and roller bearings. This report recommended the acceptance of the sizes adopted by the manufacturers of annular ball bearings as standard sizes as to bore, outside diameter and width, and the report included the different series of bearings in tabular form giving this information. The report further recommended that short type roller bearings, whether plain or taper, that the same sizes of bore and outside diameter as used on annular ball bearings shall be standard. It was considered not advisable to standardize the length of long-series ball or roller bearings.

The report contained a table giving the standard capacity for ball bearings, which standard should be accepted by the society. Tables were given showing the amount of tolerance in the matter of outside race diameter; bore and width were

Much Progress Made by the Sub-Standard Committees — Springs, Bearings, Magnetos Sheet Metals, Carbureter Flanges, Electric Lights, Broaches and Other Topics Passed on — The Standardization Work Is Saving the Industry Vast Sums Each Year

included. Although requested to give press fit allowances for the shafts upon which bearings are mounted, the committee was loath to do so in its report, because fixed sizes could not be recommended without taking into consideration the individual cases in which the bearings are used, as to whether the shafts are hard or soft, as to whether the bearings are of the light, medium or heavy series, as to the amount of freedom given to the balls and the tolerances in the bore of the bearings. If the shaft is too tight a fit it will expand the inner race, thereby producing a destructive binding action on the balls, so that judgment must be used in making use of press fit allowances tabulating them on the report.

Considerable debate followed the presentation of this report. The first question that arose was as to the recommendations of limits of eccentricity in the walls of races in ball bearings. The report recommended a plus limit of .0002 inch for each wall on one side of the axis.

Mr. Souther explained that the plan had been worked out from a zero base. Press fits and chamfers were also briefly referred to.

F. G. Hughes wished the report to be amended so that the tabulation of radial loads might be designated as average and not theoretical and ideal figures.

The reason for this became apparent when D. F. Graham arose and said that he agreed with Mr. Hughes' suggestion, and moved to strike out the columns devoted to radial loads in pounds. Mr. Graham explained that the figures applied to ball bearings and that the figures defining the radial loads of roller bearings were materially different. This was seconded and the society upheld the amendment.

Mr. Hughes also suggested that the limits of eccentricity should be raised from .0002 to .0005 inch, stating that the former figure represented a limit too severe for many manufacturers, although, he stated, that several companies gauge their bearings to the hundred-thousandth of an inch.

Chairman T. D. Buckwalter presented

a second report of the sheet metals division of the standards committee. This report containing specifications for non-ferrous metals in sheets. The report was confined to copper alloys for sheets, rods and tubes. Some of the specifications embodied in this report are as follows:

STANDARD SHEET BRASS SPECIFICATION NO. 33

Composition	
The following composition is desired:	
Copper	Per Cent 64.00 to 67.00
Zinc	33.00 to 36.00
Lead, not to exceed.....	0.50
Iron, not to exceed.....	0.10

Sheet brass shall be furnished "annealed" or "hard rolled." "Annealed" brass is to be designated as "light annealed," or "soft." "Hard rolled" brass shall be furnished in the following tempers, and the amount of reduction in thickness from the annealed sheet shall be as follows, expressed in Brown & Sharpe gauges:

Temper	B. & S. Numbers Hard
Quarter hard	1
Half hard	2
Hard	4
Extra hard	6
Spring	8

When orders call for 12-foot lengths, 40 per cent may be 10 feet or over, 30 per cent may be 8 feet to 10 feet.

LOW BRASS

Use
Used on account of color, resistance to corrosion and atmospheric changes, and on account of superior ductility.

Composition
The following composition is desired:

SPECIFICATION NO. 34	
Composition	
Copper	Per Cent 77.00 to 81.00
Zinc	19.00 to 22.00
Lead, not to exceed.....	0.20
Iron, not to exceed.....	0.10

BRAZING BRASS SPECIFICATION NO. 35

Composition
The following composition is desired:

Copper	Per Cent 74.00 to 76.00
Zinc	24.00 to 26.00
Lead, not to exceed.....	0.20
Iron, not to exceed.....	0.10

FREE CUTTING BRASS SPECIFICATION NO. 36

Composition
The following composition is desired:

Copper	Per Cent 61.00 to 64.00
Zinc	33.00 to 36.00
Lead	1.25 to 2.00
Iron, not to exceed.....	0.10

RED METAL OR COMMERCIAL BRONZE SPECIFICATION NO. 37

Composition
The following composition is desired:

Copper	Per Cent 88.00 to 91.00
Zinc	9.00 to 12.00
Lead, not to exceed.....	0.20
Iron, not to exceed.....	0.10

GILDING METAL SPECIFICATION NO. 38

Composition
The following composition is desired:

Copper	Per Cent 94.00 to 96.00
Zinc	4.00 to 6.00
Lead, not to exceed.....	0.15
Iron, not to exceed.....	0.06

PHOSPHOR BRONZE

Composition
Phosphor bronze is composed of copper, tin and phosphorus in proportions varied to suit the requirements of the trade.

COPPER SHEETS AND STRIPS

Purity and Temper
Copper sheets and strips shall be at least 99.50 per cent pure, and shall be either soft or furnished with such roller temper as may be specified.

GERMAN SILVER

Composition
German silver in rolls and sheets is to be specified according to color and service required in the following standard grades:
5 per cent, 10 per cent, 15 per cent, 18 per cent, 20 per cent, 25 per cent, 30 per cent, nickel, the balance being copper and zinc.

SPECIFICATIONS FOR BRASS RODS Purpose

BRASS RODS FOR COLD HEADING

The material shall be suitable for cold working, such as the heading of rivets and the rolling of threads for screws.

Composition
The following composition is desired:
SPECIFICATION NO. 39

	Per Cent
Copper	61.50 to 64.50
Zinc	35.50 to 38.50
Lead, not to exceed.....	0.50
Iron, not to exceed.....	0.10

FREE-CUTTING BRASS ROD

Purpose
Material suitable for automatic screw machine work.

Composition
The following composition is desired:
SPECIFICATION NO. 40

	Per Cent
Copper	61.50 to 64.50
Zinc	34.50 to 35.50
Lead	2.25 to 3.50
Iron, not to exceed.....	0.10

TOBIN BRONZE

Purpose
Turned and straightened rods for various purposes where strength and resistance to corrosion are required; also for hot forging.

Ultimate Tensile Strength
Rods up to and including 1 inch in diameter shall have a tensile strength of not less than 62,000 pounds per square inch.
Rods larger than 1 inch and up to and including 7 inches in diameter shall have a tensile strength of 60,000 pounds per square inch.

Elongation
All rods not larger than 1 inch in diameter shall have an elongation of at least 25 per cent in 2 inches.

All rods larger than 1 inch in diameter shall have an elongation of at least 28 per cent in 2 inches.

Elastic Limit
The elastic limit, or the point at which rapid elongation begins, shall be at least 30,000 pounds per square inch for all sizes.

TUBING

Tubing can be furnished in copper and the commercial alloys of copper and zinc, such as high brass, bronze, phosphor bronze and Tobin bronze.

Composition
The composition shall be as specified to meet the requirements of use.

The discussion which followed was short, Mr. Souther remarking that some of the information contained in the report, while centuries old, had never been compiled. He complimented Mr. Buckwalter for his painstaking work and the report was unanimously accepted.

The report of the frames section division of the standards committee showed that there were enormous difficulties in the way of this committee to adopt standards for frame sections on account of the greatly varying practices among the different car makers. It was moved and carried that this matter be referred back to the committee for further study and taken up again at the next meeting of the society.

Standard Carburetor Flange

On the report of the carburetor division a few corrections were offered and immediately accepted without controversy. The flanges on the 1¼, 1½ and 1¾-inch sizes were changed from 5-16 to ¾ and in the 1¾ to 2½-inch sizes the flanges were changed from ¾ to 7-16 inch. Several other minor changes were recommended and passed, although it was decided that the report should not be adopted until it was verified by further experience. The matter has been passed over to the summer session, as it was regarded as too important to make a hasty decision.

Owing to Chairman A. L. Riker of the miscellaneous division of the standards committee being ill, the reports were presented by Morris A. Hall.

With regard to the suggestion by the board of combustibles that a fusible plug be provided for gasoline tanks on all motor cars stored in garages, which was withdrawn by the board and subsequently

supplanted by several recommendations covering the same grounds, Mr. Hall reported for one of the subdivisions that the installation of a safety valve on top of the gasoline tank, set to blow off at approximately one-tenth the bursting pressure of the tank, would be much preferable to fusible plugs.

Mr. Souther stated that it had been his observation that explosions did not occur within gasoline tanks and that where fires have happened that destroyed tanks filled with gasoline, the tanks had been opened out with an action similar to that of expanding steam.

Safety Gasoline Tanks

It was pointed out that if the fusible plug suggested should be adopted and should be located in the bottom of the tank, excessive heat would not serve to open the tank because the gasoline itself would prevent the melting of the plug. If the plug could be opened it would only serve to allow the gasoline to run onto the fire.

If the plug were placed on top of the tank and should be burned out, all the gasoline in the tank would rush out in the form of combustible gas, adding to the danger of the situation.

F. H. Trego put forward the idea of locating a pop-valve on the air line, preferably as far away from the tank as possible, and actuating on a pressure of 2 pounds.

D. Fergusson agreed with the terms of the report and seconded its passage. F. E. Moscovics, H. L. Pope and M. Hall made suggestions as to the degree of pressure at which the pop-valves should be set and with regard to the brazing and riveting of the seams, and Mr. Souther moved as an amendment to the report submitted that metal gauze coverings be installed over the openings in the tanks to prevent striking back.

Mr. Moscovics closed the discussion with a suggestion that when the report was received it should only be considered as marking a stage in the development of the safety idea, and the report was unanimously adopted.

The report on standardization of magneto parts was presented by F. E. Moscovics. He put forward two sets of specifications; one for motors having a bore of less than 4½ inches, and the other for motors with a greater bore. He stated that the committee had taken the specifications of a well-known maker of magnetos and amended them in overall length so as to take in all the other standard makes.

J. N. Heald said that there was a distinct need of standardization in regard to magnetos and that it was not quite apparent to him why two sets of specifications had been included in the report.

This precipitated a wide debate in which practically all the American magneto makers took part. It appeared that the taper used in six-cylinder magnetos

was larger than in four-cylinder cars. The report did not cover the phase of magneto development represented by the automatic advance of the spark.

They all agreed that the ideal condition would embrace only a single set of specifications, but it was stated that a change at this time from the double or triple set was impracticable.

H. L. Pope moved the adoption of the report, including instructions to the committee to continue its work and to particularly include an investigation of the variance in the tapers and the progress in automatic advance.

The report was then adopted.

The report of sub-committee on electric lighting was presented and referred back to get additional data on base dimensions.

Morris A. Hall presented the report on the matter of oversize cylinders which recommended that two oversizes be recognized by the society in its standard specifications, respectively .02 and .04 inch, to cover cylinders after being reground and also those that were originally over standard size.

Ideas on Oversize Cylinders

It was argued by numerous members of the society that .02 was too much metal to be removed in all first grindings and that .04, as an outside limit, might prove too little in case of multiple grindings. The sense of the meeting was that a more flexible scale should be adopted and it was moved that the report be amended to contain specifications of four standard oversizes, namely, .01, .02, .03 and .04 inch. The report was accepted.

The report on bushings for rod and yoke ends was followed by much debate, but was eventually adopted. Originally the intention was to make this report broader than it was in its final form, but on motion of H. L. Alden the significance of the report was narrowed to include only the space for bushings in the eye of the brake lever.

Spark Plug Standards

The matter of standard specifications for spark plug tolerances occupied considerable time. The society was not prepared to agitate a change in tolerance and the report was referred to the committee for additional investigation as to method of measurement. At present the standard specifications of the society provide for a diameter of .875 or ⅞ inch for spark plugs and the matter before the meeting was largely as to the method to be used in measuring the plugs.

A. R. Mosler said that the spark plugs on the market measure from .835 to .875 inch.

D. Fergusson said that in case a spark plug is materially smaller than standard there is an excellent chance to strip the thread in the cylinder, an exceedingly costly performance. He said that if a tolerance of .003 inch was allowed between the spark plug and the hole, the tolerance recommended formerly by the

society, there would be little dissatisfaction in the matter.

Standard Magneto Sizes

In presenting the report on the importance of the magneto in relation to engine design F. E. Moscovics started one of the most interesting discussions of the entire session. In presenting his subject he referred to five phases of the question, namely, proper location, accessibility, accurate alignment, location of control levers, and proper wiring.

Under the first head he said that precautions should be taken to place the magneto so that it would be protected from oil, gasoline and engine discharges. In motors where the carbureter is on the same side as the magneto he called attention to the dangers of disastrous fires through the carbureter flooding directly upon the magneto and by the collection of waste gasoline near the sparking apparatus.

On the second head he said that great care should be taken by engineers to see that the parts of the motor necessary in proper timing should be accessible, particularly the universal joint and the breaker box. He recommended that the magneto drive be on the same plane, horizontally, as the crankshaft and if possible even higher, which would bring the breaker box into full view.

With regard to the alignment of the mechanism he said that it was a prolific source of trouble on account of improperly designed joints or improper machining of the magneto base or both. Not only do such faults result in noise, but frequently lead to the breaking down of the bearings supporting the armature shaft, especially in ball-bearing magnetos. In this division he also called attention to the necessity of using non-magnetic metal in the magneto base and fastenings and the absolute necessity of seeing that the magneto is separated from electrical connection with the engine base.

As far as the control levers are con-

cerned Mr. Moscovics said that their arrangement was purely a matter of mechanics. He called attention to the fact that these arrangements are often left to inexperienced men with the result that undue strains and stresses are frequently placed upon the breaker box. He said that the subject deserved much more care than it had been given.

With regard to wiring he urged that it was important to carefully segregate and insulate primary wiring, if for no other reason than that it takes a long time for such wiring to give trouble, but when it does, such trouble is about the hardest to locate of any of the ills to which a motor car is subject. He urged short wiring.

Reports on Broaches

The second report of the broaches division of the standard committee resulted in some interesting information being given out. In order to get at the matter as individually as possible the committee put the leading questions to the members of the society to be gone over in open session. These questions and the decisions reached were as follows:

Question 1—Shall multiple-spline holes and broaches be made to one standard regardless of whether the fitting is to be made on the large diameter or on the small diameter; proper allowance being made on the shaft by the individual designer for machining for the required fit? This proposition has many advantages, including simplicity, minimum number of broach sizes to be carried by both manufacturer and tool maker, and makes possible the adoption of certain important propositions which are easily remembered, such as, width of key equals one-fourth small diameter of shaft, height of key equals one-half the width, etc.

It was moved and carried after a large amount of discussion that multiple-spline holes and broaches be made to a standard.

Question 2—Shall the sides of the key be radial or shall they be parallel?

The discussion on this question hinged largely on the life of the teeth and the cost of manufacture. The balance favored the parallel teeth by just a shade, although a compromise between the two was suggested by R. R. Lapointe. It was finally decided that the parallel-sided tooth should be endorsed.

Question 3—Shall there be any radius at the corners of the keys?

The consensus of opinion on this subject was that it was of slight moment, the final decision being in favor of the rounded corner.

Question 4—If question 3 is decided in the affirmative—shall the size of radius be different for each size of shaft; that is, be proportional to the size of shaft as recommended in the foregoing report, or shall it be made an arbitrary, minimum practical size, as, for instance, .015 inch for all sizes up to and including 1½-inch small diameter of shaft, and .025-inch for larger sizes up to 3-inch small diameter of shaft?

It was immediately moved and carried that the curvature should be .015 for all sizes up to and including 1½ inches small diameter of shaft and .02 inches for larger sizes up to 3 inches small diameter of shaft.

Question 5—Shall the key of the four-splined and six-splined shafts be the same, or shall the circumference of the shaft be nearly equally divided in each case? The key sizes recommended in the foregoing report approximately equally divided the six-spline, but not the four-spline.

A tie vote resulted on this question and it was referred back to the committee.

Question 6—Shall one standard of sizes as regards height of key be adopted for permanent fits and fits not required to slide while under load, such as transmission gears, and another standard of sizes for fits required to slide while under load, such as the slip joint in the propeller-shaft?

Motor Truck Topics Discussed by S. A. E. Engineers

NEW YORK, Jan. 20—More attention than ever before has been given to the subject of commercial cars by the Society of Automobile Engineers at its 3-day session which ended here this afternoon. Pertinent papers on commercial cars were read. Continued discussions followed the reading of these. In addition to information brought out on the truck industry by these papers, the different sub-committees of the standards committee reported progress. The report of W. P. Kennedy on wheel dimensions and fastenings for the tires was accepted. This report dealt with the various limits of tolerance in conjunction with wheel and tire sizes for commercial vehicles.

A. B. Cumner read a paper on "Market-Europe." He stated that there was no

S. A. E. Members Consider Worm Drive, Smaller Motors and Lighter Motor Vehicles

Europe. He stated that there was no standardized product on the other side, each customer insisting on radically different specifications. In most cases, he said, a customer's order was large, and therefore the manufacturer could afford to make up the machines in accord with his views. There is no service for the owner of the single vehicle, unless he happens to possess one similar to those owned by a large user of the machines who has a private garage devoted exclusively to their repair and maintenance, and where

he can have work done. The delivery methods of several of the larger London concerns were outlined, tending to show the efficient systems which have been adopted. Two men are usually placed on each truck or delivery car, one devoting his time exclusively to driving and the other to the delivering of the goods. Each car is remanded to the garage for 2 days in each month, during which time it is thoroughly inspected and overhauled. The driver remains with the car as a helper, and in this way becomes familiar with the truck which he operates. Premiums and penalties for running and repair costs are found to work well and to reduce tire wear.

The use of experienced drivers was advocated, as well as the fact that the sales-

man should not overrate the capabilities of the truck which he is selling. Rather, the customer should be educated to the car's limitations.

The trend of English design was next discussed by B. B. Bachman, who took occasion to commend the hospitality which had been extended to the members abroad. The need for the development of small light vehicles was discussed, and average practice was outlined. He stated that the motor is usually placed under the hood in front, bodies overhang to a great extent, pneumatic tires are not placed on cars of more than $\frac{1}{2}$ -ton capacity, two-cylinder and four-cylinder motors are found in about equal proportions and that worm drive is predominant.

Motor Wagon Utility

Edward W. Curtis, Jr., read a paper on "Increasing the Utility of Commercial Cars" by auxiliary loading and unloading devices. This paper was published in detail in last week's issue of *Motor Age*. Following the reading of this paper much discussion took place.

Mr. Bailey was of the opinion that the majority of the large New York houses have too many other considerations to deal with at the present time to bother with crate or other forms of special unloading bodies. This was true in his own case, at least, he said.

Continuity of action of trucks, that is, keeping them going, is very important, in the view of Mr. Baker. He made mention of one instance where a concern used a number of $\frac{1}{2}$ -ton trucks of uniform size with interchangeable bodies very efficiently, and stated that the whole situation narrowed down to a question of individual loading with interchangeable units.

In the opinion of E. R. Whitney, unloading and loading devices are a vital factor in the truck situation.

The paper on "Motor and Transmission for Commercial Cars," by E. P. Batzell, was not read. Mr. Souther touched on the principal points of the article as brought out by its author. It shows that the average truck motor need not be very large, and also brings out that the motor speed should be about 800 revolutions per minute. The chairman noted that this speed was about twice lower than present practice. The paper further discussed the subjects of fuel economy and power required, together with the relative cost and operation economy.

C. T. Myers remarked that the tendency was toward the use of smaller motors and moderate speeds around 1,000 revolutions per minute. The problem is almost entirely one of transmission design and fuel economy, he said. In the constructions with which he was familiar, the transmission was designed from the low gear as a basis, the higher ratios being made to conform to that. Incidentally, he made mention of the fact that the White truck motor is smaller than any other made in this country.

The electric truck has a bearing on the subject, according to J. C. Perrin, who explained that the gasoline motor must be made larger than the electric motor for the same reason, since its overload capacity is very much less. He was of the opinion that the tendency is for larger truck motors than necessary.

In connection with the selling of trucks, C. T. Myers stated that the matter of the guarantee was very much of a mooted question. He advocated the adoption of standard truck specifications, to which salesmen should be instructed to adhere rigidly. A standard test hill up which each truck should be driven under full load, the efficiency of the machine being based on this performance, was suggested. This would largely do away with the confusion now experienced due to widely varying and sometimes impossible performance claims made by salesmen for purely selling reasons, he thought.

Customers' ideas differ as to the meaning of the phase which involves speed and mileage, and it should be clearly explained to them, W. H. Conant said. He also made mention of the fact that this same standardization idea was brought up by himself a year ago, and that at that time it received very little consideration.

In the view of F. E. Moskovics, this discussion referred back to a paper by W. P. Kennedy at Dayton, in which the salesman element was brought out and illustrated by one particular instance where one identical truck was guaranteed to two different customers to go at speeds of 30 miles and 12 miles an hour, respectively.

Worm Drive Analyzed

That the subject of worm drive is a live one was evidenced by a paper on "Worm and Gear as the Ultimate Drive Applied to Heavy Motor Vehicles," by R. H. Rosenberg. He brought out results obtained from exhaustive experiments on the worm drive and stated as a result of these that he believed the worm gear to be the most logical means of reduction, especially for truck construction. The question of cost was next discussed, Mr. Rosenberg stating that he considered the worm gear the cheapest form of final drive when properly constructed. Concerning the durability of this form of gear, he added that he had inspected gears after they had been run 120,000 miles and found them in excellent condition.

The fact that the General Omnibus Co. of London had adopted the worm drive in the face of the enormous number of gear changes per day, the average being 800, was cited by Mr. Barker as a great argument in favor of the worm drive. Worms which had been in operation for over 60,000 miles at an average rate of 130 miles per day have been examined and the signs of wear are absolutely imperceptible. At the same time, an efficiency of 97 per cent is attained. The silence of the worm drive alone was such a great

advantage, in Mr. Barker's opinion, that it was sufficient cause for the adoption of this type of drive.

John McGeorge voiced the opinion that in using the Henry type of gears it was better practice to have the worm above, as better lubrication was secured on account of more uniform distribution of the oil. David Fergusson fully indorsed the adoption of the worm drive for use in heavy cars, with a reduction of 8 or 9 to 10. For the lighter trucks and pleasure vehicles this drive is still problematical. It has not as yet been sufficiently tried out. Mr. Fergusson further stated that he thought the time for the general adoption of the worm drive in cars for pleasure purposes was not very far distant. J. Lehman expressed the opinion that the worm drive was satisfactory for any degree of reduction from 6 to 15 to 1. The car used in the cutting of the teeth was the greatest factor in reducing the coefficient of friction. In some of the patented machines used abroad the teeth are practically finished as they leave the cutter. There is little or no hand work required in this case, the principle operation being that of grinding in the teeth in the same manner as valves on a gas engine are ground in. The coefficient of friction of teeth which have been turned out by these machines is about .009 or .01, whereas with hand finishing as is required in this country the coefficient reaches .025.

H. L. Ballinger, of the Arrol-Johnston company, of England, was called upon by the chairman to express his opinions on the worm drive and pronounced himself to be of the opinion that the bevel drive could be made just as quiet, if the same care were exercised in its manufacture. This being the case, he did not see the use of expending power on the added friction of the worm drive. Mr. Lehman expressed a difference of opinion with Mr. Ballinger and stated that the loss of power through friction was by far greater in the case of the bevel drive than in that of the worm drive. In his opinion, the best result that could be secured with the bevel drive was 92 per cent efficiency, while in Germany a certain factory was turning out continuously a worm drive in which an efficiency of 98.25 per cent was secured steadily.

Charles D. Whitellsey, in a paper on "Mechanical Points in Connection With the Construction of Solid Motor Tires," brought out the fact that solid motor tires can wear away and suffer as much from misuse as pneumatic tires, and stated further that the misuse to which they are generally put is largely due to the fault of the manufacturers in not educating users to an appreciation of the tremendous difficulties that have been surmounted in bringing them to their present state of efficiency. A brief historical review of the solid tire was then read, after which its construction, size and shape, life, troubles, etc., were taken up.

"WE HAVE WITH US TONIGHT —"



NEW YORK, Jan. 19—It was a good-natured gathering of almost 300 members of the Society of Automobile Engineers and guests who had assembled in the Belvidere room of Hotel Astor when Toastmaster Souther took his place at the head table for the annual banquet tonight. It was expected that close to 400 members would attend, but holding the dinner so late in the second week of the show barred a great many engineers who were forced to return to their factories in order to get things ready for the Chicago show. Others had taken up headquarters at Philadelphia for the week. In spite of these disadvantages, the attendance was the largest in the history of the society dinners.

The good wit and humor of the many members was so apparent and it was evident from the start that the society is making enormous strides in the development of the social spirit of its members. Chairman H. M. Swetland, who had the dinner arrangements in charge, deserves special credit for the entire arrangements which were carried out in every detail. The interesting multi-page menu was a creation of his and took the form of a burlesque, introducing as it did such engineering conceptions as micrometering oysters, taking the specific gravity of soups, etc.

Addresses Are Interesting

A commendable departure in the dinner this year was the presence of half a dozen speakers who filled in the time after the dinner proper was over, the addresses being a big improvement on the vaudeville entertainment of former years. President Henry Souther, who formally retires from office at the completion of the present session in his toastmaster address re-

TOASTMASTER SOUTHER REVIEWS HIS YEAR'S WORK

At the left are President-Elect Donaldson and General Manager Clarkson. Historian Birdsall is at the right

viewed the year's work of the engineers, chiefly that portion of the activities relating to the work of the general standardization committee and its various sub-committees.

"This is to be," remarked Mr. Souther, speaking of the S. A. E., "one of the most influential technical institutions in America, if not in the entire world. In my judgment no more stalwart organization of men can be found in the country. Take the work of the standards committees: A little over a year ago there were over 1,100 different sizes of steel tubing and today we have but 150 different sizes. These 150 answer all requirements of the motor car field with the exception of the extraordinary cases. The draftsman laying out a steering gear can refer to his data book and get from these 150 one to suit him.

"One manufacturer of gearsets recently stated that he did not think there was much in the S. A. E. for him, that it did

not concern his line of manufacture and there was not any reason for his being interested in the work. His main idea was that he had to supply parts to suit his customers and that the work of the S. A. E. would not help him in this. When it was pointed out to him that his various customers have the S. A. E. data books before them and that they specify standard parts for their gearsets he readily saw that the work of the society was specially vital to him and that he could not afford not to be a member.

"In the lock washer division there were over 700 different shapes and diameters in use in the car trade. Today there are but thirty-two, and every requirement can be met as well with these thirty-two as with the 700.

"The standardizing of wood wheels for trucks has brought co-operation among the rubber men, the wheel makers and the man buying the truck. Several business houses now using trucks and in the market for more, have written the society stating that they will not purchase trucks which have not the standardized wheel sizes. With the standardized wheel size it is possible to fit different makes of tires, where at present to change the make of tire in some cases means buying new wheels also.

Standardizing Bearings

"The standardizing of annular ball bearings has been brought to a satisfactory stage so that if an engineer specifies No. 212 he knows what he is going to get and the bearing maker has not to put through special lines for him. Magneto bases and couplings are now so standardized that a car owner can change his make of magneto without any trouble, as to fitting on

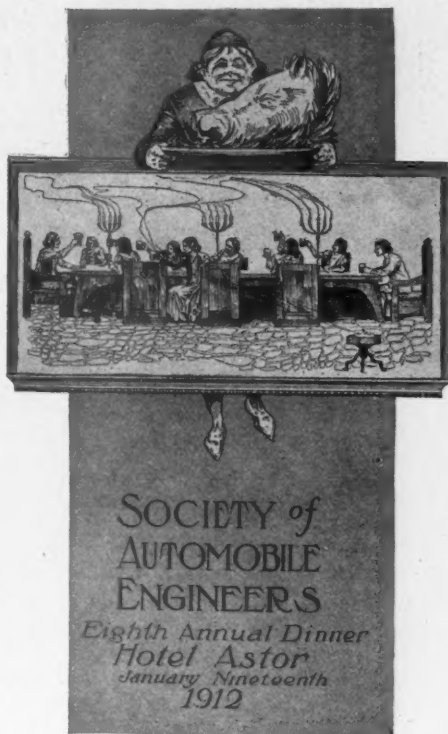
the end bed plate or coupling to the drive shaft. Fully 98 per cent of the magnetos are now made to standard size.

"Good progress was being made with the standardizing of electric light parts, such as lamp voltage, lamp bases, etc. The advent of the self-starter has upset this entire matter and new work will have to be carried out. Good progress is being made with carbureter flanges. Today to change the make of carbureter often means to get a new intake manifold. This should not be. The adoption of standard sizes of flanges would be the change of a carbureter as simple as that of the magneto. This also applies to the water connections for the carbureter jacket.

"There are some things that are standard and some that cannot be standardized, such as gearset quadrants; and while the society has not taken the liberty to set definite standards, it recommends certain standards which the engineer may follow. The fire underwriters are now becoming very acute in motor cars and the society has taken up the matter of safety gasoline tanks, using a safety gauze in gravity flow tanks and a safety valve for pressure feed systems. These are meeting with the approval of the underwriters.

Compiling Specifications

"The steel makers have at last gotten together in the work of a final compilation of specifications for the different carbon and alloy steels. A ready-reference kind of nomenclature has been adopted in which carbon steels, nickel steels and chrome-nickel alloys have their specifications partly indicated in the title of the specification. The 10 series is for carbon steels, the 20 series for nickel steels and the 30 series for chrome-nickel steels. Thus, 23-20 means nickel steel with 3 per cent nickel and 20 points carbon; 33-50 indicates a chrome-nickel steel with 3 per cent nickel, 50 points carbon and the proper percentage of chromium. In addition to adopting this nomenclature, the revised specifications of steel, iron and aluminum cover every possible case that may arise. These specifications will be revised from year to year. Spring makers have made good progress in their work



COVER OF S. A. E. MENU

as also have those who have the sheet brass field."

H. F. Donaldson, president-elect, was hailed with continuous cheers when he was introduced by the toastmaster. His remarks consisted of reminiscences of the European trip of more than forty members of the society during last November and December. In speaking of English hospitality he said: "From the time we reached Liverpool we were in the hands of our friends who escorted us to London,

and although trains were 6 hours late, the reception committee waited at the Easton station until the engineers arrived. This same hospitality continued throughout the entire visit."

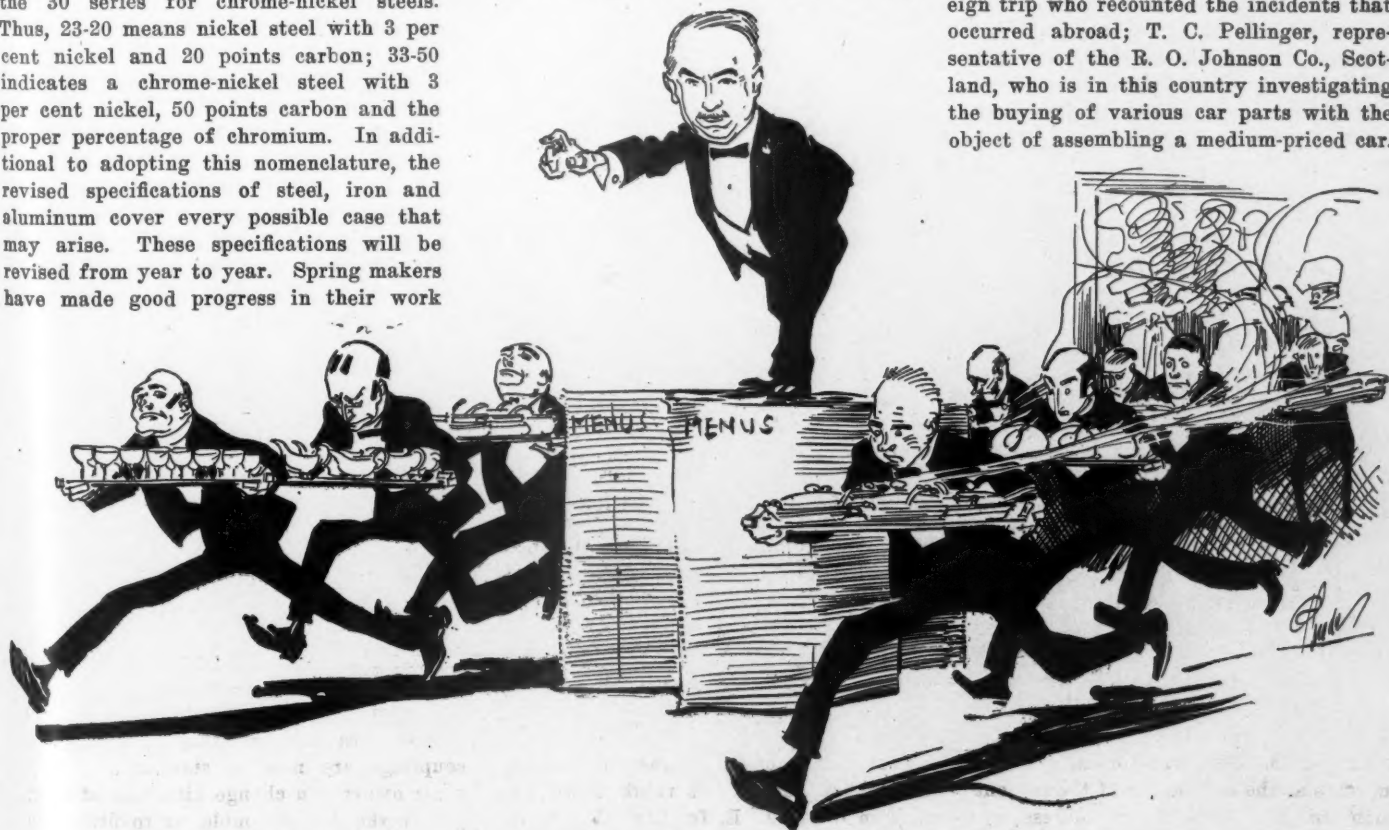
In speaking on the general field of usefulness of the S. A. E., the president-elect spoke of the possibilities of friendship in the organization which are greater than in any other organization in the motor car field today. This business friendship is a permanent investment to every member. No memory of the European trip was fresher than that of the friendships established abroad.

While President-elect Donaldson was delineating the many pleasures of the trip by ship as well as the experiences in London and Paris, many questions were being hurled at the different members of the party. W. E. Metzger was remembered as the bridge champion; Walter Baker established a record by not leaving his stateroom. Many requests were made to hear the president-elect speak French; and others wondered how he sprained his ankle while abroad.

Talk by E. T. Birdsall

E. T. Birdsall played the role of the S. A. E. Herodotus, bringing to the light of 1912 some of the pioneer efforts of the S. A. E. He told of the inception of it in the Flatiron building, New York, and of how the society consisted of five members during the opening year. Today it is 1,200, with thirteen applications for membership before the counsel and sixty-seven others not reported.

Other speakers were R. M. Lloyd, one of the members of the society on the foreign car, and Mr. McCormick, representative trip who recounted the incidents that occurred abroad; T. C. Pelling, representative of the R. O. Johnson Co., Scotland, who is in this country investigating the buying of various car parts with the object of assembling a medium-priced car.



CHAIRMAN SWETLAND OF THE BANQUET COMMITTEE WAS A BUSY MAN AT THE ANNUAL S. A. E. DINNER

Engineering Papers Read Before S. A. E.

Discussion Before the Society Participated by Many Members—Talk Is on Wire Wheels, and Worm Drive, Valve Designs, Silent Chains, Carburation, and Other Subjects of Interest to Designers

NEW YORK, Jan. 20—Almost a dozen technical papers dealing with one phase or another of the motor car question were read and discussed at the 3-day session of the Society of Automobile Engineers which ended this afternoon. The subjects included in these were particularly broad, among them being "Self-Starters," "Wire versus Wood Wheels," "Worm Gears," "Non-Poppet Valve Motors," "Silent Chains," "Automatic Spark Advance," "Compound Gas Engines," "Balancing of Motors," "Diffusion of Gasoline," "Vapor and Carburation," etc. These topics are all live ones, and often when the papers were read did not bring out many points of special importance; the discussions which followed did. These papers will be printed in detail later.

Self-Starters Needed

J. W. Fitzgerald in "Starters for Gas Engines" confined himself to a review of those types at present on the market, on which he classified and summarized the points pro and con on each. In the discussion, F. E. Moscovics called attention to marked signs of stratification in the motor cylinders when acetylene was used. It was noticed that the acetylene was forced into the cylinders and the spark thrown on so that the motor did not start, but when the operator left his seat and walked about his car for the purpose of turning the starting handle the car started before he had reached the handle.

L. D. Hubbell stated that an electric starter in order to be a success must be built in the motor and not applied after the motor has been built. He also stated that it was the case that as many as seven movements were required to start some of the self-starters and that in the same length of time and with the same amount of trouble the operator could have turned over the crank of the machine and started it by hand, instead of using the starter at all. The general attitude of the society seemed to be that they were all watching the development of the self-starter question and that they were looking for a simple, cheap and reliable system that would not only start the car just after it had stopped running, but after it had stood for a week in a cold climate.

J. B. Hull, in "Non-Poppet Valve Motors," reviewed all of the common type of sleeve and rotary styles now on the market.

L. B. Brown spoke against the non-poppet valve, stating that the added silence did not have the importance which had

been given it. He added that, while a non-poppet-valve motor probably could turn over regularly at the lowest speed at which the flywheel would compress the charge, there was no advantage to this, since a driver in a crowded street would not keep his engine in high gear, whereas a driver in the country would not care to run at the minimum speed. Mr. Brown further stated that the cost of repairs of the non-poppet valve in such cases as neglect of lubrication was much greater than the cost of repairs on engines of the poppet type. C. S. Goby remarked that he believed the increased valve area of a sleeve-valve motor would result in an increase in power. This would be greatly to the advantage of this type. Mr. Souther took up the discussion here and gave it as his opinion that a good, quiet poppet-valve motor was a hard thing to surpass, and that after all the matter was that of the survival of the fittest.

J. G. Perrin in connection with the question of silence of the non-poppet stated that in his opinion silence was obtained in a number of cases with non-poppet motors at the expense of very necessary features. Herbert Chase contended that a great advantage was obtained in the shape of the combustion space in the non-poppet motors and furthermore that the cost of manufacture would not be high after the tools had been developed. Another great advantage, in the opinion of Mr. Chase, was the flat torque curve of the non-poppet motor.

Silent Chain Talk

A paper on "Silent Chains," by Chester S. Rieker, provoked much discussion. The paper was voluminous, filling fifty-eight pages, and the author confined himself to calling attention to a few facts. Lewis A. Hill, in opening the discussion, was of the opinion that certain information in the paper was dangerous, the information in question being that furnished by the Renold Chain Co., in giving the different sizes of chains to be used on different sizes of motors. Mr. Hill contended that conditions vary to such a large extent that it is impossible to lay down any set of rules which would cover every condition. He also stated that adjustments must be provided where the chain is in contact with more than two gears.

H. F. Donaldson, a member of the party which made the foreign trip, stated that the chain gearboxes used on the London buses was of especial interest to him, as the General Omnibus Co. adopted what was thought the best possible thing without caring much for appearances. This

concern was at first greatly taken aback by the requirements of Scotland Yard, which seemed impossible to live up to, but it was found that, with the use of a little ingenuity, all the provisions made by the authorities could be readily observed. The chain gearbox has been universally adopted by this concern and has given great success under the very rigorous conditions imposed.

Mr. Hill spoke on the advantages of the split-bushed link, stating that a higher grade of strip material than rolled could be procured. Greater accuracy is also obtained by wrapping the strip material, while the cost of assembling is lessened. The fact that grit interferes seriously with the life of the chain was brought out by several of the members, who cited examples of this. The fact that centrifugal force does not interfere with the pitch was also brought out.

Wire Wheel Topics

A paper on "Wire Versus Wood Wheels" was listed to be read by B. Morley and C. B. Hayes, but as neither was present these topics were restricted to a written discussion by H. K. Thomas, who declared that wire wheels were not used in England only for their strength, but also for their durability and lightness. Five wire wheels, according to Mr. Thomas, would weigh about the same as four ordinary wood wheels. Objection was made to the statement that there was such a large proportion of cars driven in England by chauffeurs. This was declared to be untrue, and it was noted that a large number of the motor cars driven by chauffeurs were to be found among the town cars as in this country. Longer tire life should result from the use of wire wheels on account of their great resiliency, but the number of spokes, on the other hand, is a great drawback. This introduces the feature of difficulty in cleaning, which is one of the greatest reasons why wire wheels are not adopted by the taxicab companies in America. The cost of cleaning the cars is a very large item where a number are considered, and for this reason where the added cost of cleaning a car is so great the advantage gained by tire saving is lost.

Mr. Baker performed experiments on the hickory spoke and showed that it was decidedly inferior to the ordinary American wood spoke. It broke at 10 pounds, while the American spoke broke at 27½ pounds. The early history of wire wheels was brought up, and it was shown that the greatest reason for giving them up was on account of the added cost of cleaning. Ac-

cording to H. W. Alden, the greatest reason for giving up wire wheels was the fact that the public, through prejudice, insisted upon the wooden type.

There were several references made to the failure of wire wheels in the early days, especially in 1905, when, it was declared by F. E. Muskovich, they did not stand up, owing to the number of spokes. The success of the American wire wheels on the Blitzen Benz was also pointed out, there having been some replacements made on this car, some American spokes being fitted in place of those of English manufacture. The wire wheels on this car are a success and seem to be able to fully hold their own with the wooden wheels with which the car was originally equipped.

Constancy of Gasoline Diffusion

Forrest A. Heath read a paper on constancy of gasoline diffusion and homogeneous carbureting of air, and the evolution of a practical method of introducing the air into the fuel-generating apparatus of motor vehicles. This provoked a great deal of miscellaneous discussion on homogeneous carburetion. One of the leading questions on Mr. Heath's paper was propounded by Mr. Butler, who requested information regarding the effect of the carbureter waterjacket on the grating over the helix. Mr. Butler brought forward the point that the globules of gasoline coming into contact with the heated metal would be vaporized very rapidly. An additional query which was also of great interest was in regard to the size of grating employed in the experiments and if this grating were all of the same size.

When Mr. Heath had concluded reading his paper he stated that in spite of some of the broad claims made by many it was understood by those who were acquainted with the facts that the modern carbureter, although a very wonderful piece of mechanism, did not in any case give the highest possible results at all speeds. It was Mr. Heath's claim that the use of the helix would produce an increase in power of 250 per cent in the motor when that motor was running in the car and not on blocks. The structural complications of the newest types of carbureters were also claimed by Mr. Heath to have a very deleterious effect on obtaining the best results. A. J. Myers made queries along the line of the effect of the helix on the condensation of the gasoline. Mr. Heath's reply indicated that he had obtained fully 50 per cent less condensation when using the helix and that this conclusion had been reached by the employment of a glass intake pipe.

Balance of Motors

Ernest R. Fried treated on the subject of "Balance of Automobile Motors" in a highly mathematical way. In the discussion Professor Hutton, who has been carrying some testing work on aeronautical motors told of arrangements for referring the vibrations of the motor in an up and down motion to some plane which would be fixed in this direction and free

from the influences of the vibration of the walls and ceiling. This device consists primarily of an I-beam which extends across the room. A platform is fixed to this and three heavy springs which suspend a weight of 150 pounds. From the latter weight there are three other springs which suspend a casting weighing 50 pounds. With this apparatus it is found that vibration is absolutely eliminated in the lower weight.

Mr. Fried questioned Professor Hutton as to whether he ever had tested a two-cycle motor on this apparatus and noticed the severe rocking effect given by this motor. He also stated that with this type motor, which he believes to be the coming type, that these vibrations are the chief obstacle to its progress. Experiments had not been performed by Professor Hutton on any motors of this type.

In response to a query put by L. B. Brown as to whether any experiments had been performed on the V-type of eight-cylinder motor, Mr. Fried replied that the same mathematical method as had been applied in the case of the vertical type of four-cycle motor could be successfully applied.

The paper by L. R. Smith on "Automatic Spark Advance" contained several statements which were objected to by the various members. Mr. Smith stated in his paper that expensive self-starting devices can be done away with if the automatic spark advance is fitted. This, as Mr. Muskovich remarked, was not necessary to comment upon as it was obvious that the claim was slightly overdrawn. Another objection was offered to the statement that there is but an inappreciable time between the beginning and end of combustion. This the author himself disproved

later in the paper, according to F. E. Muskovich, who stated that there is an appreciable time and one which may be readily calculated and which was taken into account in all timing calculations. This same gentleman went on to say that the automatic spark advance cannot be taken as the cure-all for motor troubles, as there are certain important features which the automatic advance does not take into account. Engines running at the same speeds will require different timing which will depend very materially on the load on account of the inertia of the gases in the intake manifold and the different speeds of flame propagation due to the varying richness of the mixture. The discussion which followed brought out the general opinion that the automatic advance was a good thing in the hands of the average chauffeur, although it was conceded that an expert driver could get a little more from his motor by having control of the spark advance.

Discussion of the Spark

A point offered by L. B. Brown was to the effect that it was very seldom that a driver ran at a speed under 14 miles an hour on the high gear and that when such was the case he generally dropped to a lower speed so that the motor speed did not vary to such an extent as was often supposed. At the same time the spark position depended to a much larger extent on the throttle opening than it did on the speed of the motor. The difference in the rate of flame propagation at night when the oxygen in the air is greatly in excess of what it is on a warm day was brought out and taken as an example to show how the spark advance would have to be altered under such circumstances to produce maximum power. The general tenor of the discussion was to the effect that while a skilled driver could get more power from the car with a hand controlled spark, the average chauffeur was not willing to go to the trouble to find the best position even if there was an extra expenditure for fuel on the part of the car owner.

Use of Steel Wheels

On the subject of steel wheels, which was the concluding paper of the commercial section, A. J. Slade mentioned that steel wheels cost more than wood ones in the United States, while an equivalent set of wood wheels in England cost 120 per cent more than they would here, which considerations probably account for the steel type there and wood in this country. The tendencies in wire wheel construction abroad were outlined, and it was also mentioned that some of the English manufacturers adhere to the wood type. Mr. Slade further said that life of the tires was not materially affected by use of either wire or wood wheels, although it is generally conceded that the wear is the greatest with the former. He was also of the opinion that all things being considered, wood wheels are better adapted for the United States.

Motor Car Literature

"Look Here" are the words that confront one above a mirror on the cover of a booklet and below the mirror is the question, "Would you trust this fellow's judgment on a magneto?" This unique bit of advertising is from the Remy Electric Co., Anderson, Ind., and the story, illustrated in colors, deals with the merits of the Remy magneto and represents an electrical expert explaining the mysteries of ignition devices to a friend.

"Motoring the Arctic Regions" tells the story of the Abbott Bull-Dog through the Yukon territory, as related by Dr. Percival, the driver of the car. Incidentally, Abbott specifications are given.

The contest board of the American Automobile Association has just published its official 1911 record, which contains the results of all speedway, track, road, hill-climbing, and reliability contests, with the cars and drivers finishing first, second and third in each event. Additional data, such as a summary of all Glidden tours, lists of registered drivers, tracks, and stock cars is given. Price \$1.

PLEADS FOR LIGHT WEIGHT

Wichita Correspondent Compares Motor Car With Other Vehicles

WICHITA, KAS.—Editor Motor Age—There is something radically wrong from an economic or business point of view with the construction of the motor car of today. Just where this fault lies we may not be able to point out at this time, but in the course of a very few years at most the present cumbersome, bulky, locomotive-appearing motor car now seen on our public highways will be looked upon as a source of wanton waste.

This thought will be readily comprehended by the comparison of weights of motor cars with the weights of various other vehicles of transportation now in use throughout the world, as, for instance, a bicycle weighing 30 pounds will carry with ease a weight of 150 to 200 pounds, or from five to eight times its weight, day after day and give year after year of service with only a nominal cost of upkeep; an ordinary carriage is equal to about its own weight in carrying capacity; a farm wagon will weigh from 1,100 to 1,400 pounds and has a carrying capacity of from 4,000 to 5,000 pounds, or about four times its own weight; an ordinary box car built not only for swift running and rough usage, but to be butted, jammed, tossed and punched about in yard after yard by all kinds of reckless drivers of ponderous engines, weighs as a rule not to exceed one-half its carrying capacity.

A point of attack is likely to present itself here, as it is quite possible that you have in your mind a motor car of self-contained power and to this you attribute its license to its extreme weight over its carrying capacity. However, a motor truck weighing 2 tons has a carrying capacity of not less than 5 tons, or two or two and one-half times its own weight; and a motor cycle, which is probably the swiftest burden-carrying vehicle in the world with a self-contained power, weighs from 200 to 250 pounds and has a carrying capacity of two passengers or 400 pounds, or twice its own weight, and, strange to say, you have never heard of a motor cycle breaking down because of an extreme load.

The lightest five-passenger motor car known to the world today weighs at least twice as much as the load it will carry, while the greater majority of motor cars weigh from four to eight times the amount of their carrying capacity. Did it ever occur to the motorist as being extremely ridiculous to see an insignificant man weighing from 125 to 200 pounds being transported down the street of any city or over the public highways of the country in a monstrous locomotive-like construction called a motor car with a weight of from 3,000 to 5,000 pounds, or from ten to thirty times the weight of its load?



DIGEST OF COMMUNICATIONS

A Wichita correspondent believes engineers should devote more of their time to reducing the weight of cars and make a comparison of weights of motor cars with weights of various other vehicles of transportation. A bicycle will carry from five to eight times its own weight; a carriage is equal to about its own weight in carrying capacity; a farm wagon will carry four times its own weight, and a motor cycle will carry twice its own weight, yet the lightest five-passenger motor car weighs at least twice as much as the load it will carry, is the contention made.

Tennessee reader suggests method of increasing the pressure of the induced charge by allowing the pistons to compress it in the crankcase and outlines way in which it might be done. Method would result in more uniform suction on carbureter and better mixture, it is claimed. Gas would be compressed twice for each explosion.

Again, there is something seriously wrong with the designers at some point of this proposition. There is a tremendous waste of many millions of dollars every year in the United States for the transportation of unnecessary weight and also in the extra material and workmanship used in the building of heavy motor cars.

If one-half the amount of energy and genius had been expended in reducing the weight of a motor car as has been spent in reducing the weight of flying machines there would have been a wonderful revolution in motor car construction of this age. A motor car is a means of transportation or conveyance of the earth's inhabitants from one point to another, regardless of the efforts of the various manufacturers to imitate locomotives, which are not means of transportation or conveyance, but a power for the handling of a multiplicity of conveyances of transportation.

When this weight problem is solved, then also will the tire problem be solved. The money that is required to pay for 5,000 miles tire service will then pay for 20,000 miles. Also other expenses will then have a corresponding trimming, including the first cost.—J. J. Jones.

The Readers'

EDITOR'S NOTE.—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

Increasing Pressure

SAVANNAH, Tenn.—Editor Motor Age—In the Clearing House columns I read with interest "Suggestions for Increasing Power of Motor by Forced Induction of the Charge." It seems that the idea was to force pure air, under pressure, through the carbureter. Motor Age suggests that there "might be difficulty in adjusting the carbureter for all motor speeds under the variations of air pressure." I wish to offer the following as a probable solution of the problem:

Instead of forcing pure air through the carbureter, force the mixed charge into the cylinder. It could be done this way: Let the carbureter be connected to the intake port of the cylinder, as is common with four-cycle engines, and also connected to the crankcase, as with a two-cycle engine. Place a check valve in the pipe from crankcase to carbureter and as close as possible to the crankcase. Arrange a passport from crankcase to cylinder, opening to cylinder just above the piston when the piston is at the bottom of the stroke, as in a two-cycle engine. Also, a valve would be needed in this passport to open, connecting the cylinder and crankcase, only once in a cycle of four strokes. This valve should open just as the piston reaches the bottom of the suction stroke and stay open only long enough for the compressed charge in the crankcase to rush into the partial vacuum in the cylinder, which also contains a charge. In the case of the sleeve motor this valve could be arranged very easily. The cycle of events will be:

1—Power stroke.

2—Exhaust stroke or scavenging stroke, discharging the burnt gases remaining in the cylinder and drawing a charge into the crankcase.

3—Suction stroke, drawing a charge into the cylinder, compressing a charge in the crankcase which at bottom of stroke passes into the cylinder combining with the charge drawn in with the suction stroke. Both of these charges are properly proportioned with air and gasoline, consequently the resulting charge is correctly proportioned, but is capable of doing more work since the addition of the crankcase charge.

Clearing House



EDITOR'S NOTE.—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired

of Induced Charge

4—Compression stroke. A higher compression will be the result of more gas in the cylinder to compress.

This plan would give a more uniform suction on the carbureter, thereby making carbureter adjustments easier to make instead of more difficult. I believe that the charge would be mixed better and then gasoline vaporized better because the charge will get two compressions in the crankcase and one in the cylinder.—J. B. Walker.

It is probable that the arrangement suggested would result in an increase of power on account of the increased compression and of the more thorough mixing of the gasoline vapor and air that forms the charge. It is very doubtful, however, that the improvement in operation resulting would pay commercially for the necessary complication of parts required. As a racing construction, where power is to be obtained at any expense, the design seems to be at least worth a trial.

QUESTION OF CYLINDER DESIGN

Poughkeepsie, N. Y.—Editor Motor Age—What is the advantage of a T-head motor over the L-type and in addition to any features that may add to the efficiency of the motor, is the T-type more accessible than the L?

2—What is the advantage of the floating axle over the semi-floating; and is it not a fact that the semi-floating does not require any more repairs than the full floating and will wear as long?—L. P. Gillespie.

1—The chief advantage of the T-type motor is its accessibility and the symmetry that is possible in the arrangement of its external features, such as the carbureter, magneto, water pump, etc. Under ordinary conditions and with the majority of L-type designs the T-type motor is more accessible than the L-type. There are, however, many L-type motors in use which are equally or perhaps even more accessible than some T-type motors. As for the relative efficiency, all depends upon the design and construction. It is even claimed that more efficiency is obtainable from the L-type motor because of the more nearly spherical construction

DIGEST OF COMMUNICATIONS

Discussion of the relative advantages of the L and T head types of motors and floating and semi-floating rear axles.

A New Yorker thinks designers should make it easy for the man who cares for his own car by giving a protected inclosed space for carrying a spare tire; have a minimum of bright parts; use linoleum for covering car bodies; have a power pump, easily accessible gasoline and oil tanks, etc.

Theory is advanced by a motorist at Decatur, Ill., as to how water gets into the carbureter. Condensation is blamed and the cure is declared to be had in using the hot water or exhaust gas jacket found on most carbureters but which generally is neglected.

Minnesota has just put into force a new motor law, the strong point of which is the clause compelling the universal use of lights at night, which meets the commendation not only of motorists but non-motorists as well.

of the combustion chamber possible. It might be safe to say that both the accessibility and the efficiency of either type depend upon their respective design and construction. There are some makes of L-type motors in which the valves are even more accessible than those of T-type motors, and being all on the same side, they are most convenient in case of repair or adjustment.

2—The chief advantage of the floating axle over the semi-floating type is that practically the entire working mechanism of the axle can be removed without disassembling the axle from the car or removing the wheels. This is a feature which greatly facilitates repair and adjustment. It also is claimed that the floating rear axle can be made stronger because the wheels bear directly upon the axle tubes or axle housing instead of being secured to the shafts that drive them. In the semi-floating rear axle, the wheels being secured to the driving shaft, all road shocks must be sustained by the shafts. As for the wearing qualities of the two designs, however, all depends upon the design and construction. Some of the best and highest-priced cars use a semi-floating rear axle.

RAISE POINTS ABOUT UPKEEP

Makers Should Cater to Man Caring For His Own Motor Car

NEW YORK—Editor Motor Age—As the wealth of this country has been so unequally divided, it must follow that the number of persons to whom the expense of upkeep is an important item by far exceeds those to whom money is no particular object. Most persons of limited means who desire to keep a motor car must of necessity take care of it themselves. As it takes a greater part of their time and energies to earn their living, the time required for keeping a motor in a presentable condition and properly supplied with oil, grease and gasoline is a very important item. It would appear that now that the main mechanical points have been pretty well worked out that it would pay some manufacturer to build a car especially for this class of trade, even if the first cost were a little higher.

As a few of the requirements of such a car, which might be easily obtained, if the designer would work with this end especially in view, I would mention the following:

A protected and closed space in which to carry the spare tire. An extra shoe is as necessary a part of the car's equipment as a jack, and yet how few cars have this convenience. It would be very easy to construct a compartment at the back of the tonneau into which a tire could be slipped without any labor at all and where it would be protected from the sun, rain and theft. It would be instantly accessible and one could dispense with tire covers, tire holders, buckles, locks, etc., all of which are expensive and troublesome.

There should be a minimum of bright metal work. Keeping brass bright is slavish work and unless it is bright it detracts from the appearance of the car rather than increases it. The japanned lamps with nickel fronts are a very good move in this direction and nickel mountings in general can be kept clean and bright with far less labor than brass.

The present highly varnished and polished body is by no means an easy thing to keep in proper condition. I often have thought that some composition similar to linoleum with a dull finish would make an excellent material for covering car bodies. Linoleum of the dark brown mottled variety has a most pleasing appearance. It is practically indestructible, does not show the dust, does not scratch, is not affected by grease, oils, gasoline or water, and can be washed very easily with ordinary soap and water. It could be applied in panels so that a part could be replaced if by any chance it was damaged. I believe that, properly applied, it would make a very handsome finish and would not be any more expensive than the seventeen coats of paint which are now used in good cars. It is much employed as a top for tables in smoking

rooms and bars of steamships and gives excellent satisfaction.

A permanently-installed power pump for the tires is certainly a very desirable feature for the owner-driver. It is no easy task to pump up a large tire by hand at any time and one is very apt to get overheated in the process and then chilled when you start to drive again. If, as is sometimes the case with old tires, it has to be often repeated, it may spoil the pleasure of an entire day. Furthermore, if only the hand pump is available a driver is very apt to shirk the work and insufficient inflation with resulting damage to the tire is the result.

Easily accessible gasoline and oil tanks are an important essential. In some cars the labor of getting at these tanks to fill them is no small item and the process takes considerable time. The same holds good for grease cups and the openings for lubrication in the transmission and differential. All of these should be especially built so that they can be easily reached and with large openings so that they can be easily and rapidly filled. Every facility in this line saves time and makes for the better care and longer life of the car. Many a grease cup has been allowed to go dry simply because it was so difficult to get at.

A reliable self-starter is most important. Wading around in the mud or rain to crank a car, especially when dressed for a social function, is the most disagreeable feature about driving a motor car.

There are other things, such as electric lights, gasoline gauges, etc., etc., all of which are time and labor savers, but I am only trying to suggest a few of the things which should be incorporated in the car.—M. H. Foster, M. D.

ADJUSTING ENGINE HEADS

Decatur, Ill.—Editor Motor Age—The question of water in the carbureter has been asked and answered in the columns of Motor Age many times; but I believe there is one point which has been overlooked. The average motorist blames the gasoline or the strainer when the gasoline probably was perfectly free from water when put into the tank.

In the case of any carbureter, especially if a decided venturi effect is sought, the walls of the mixing chamber will be greatly reduced in temperature. This is caused by the constricted part of the venturi tube. It is evident that at this point the velocity of the gas is greatly increased and the internal pressure of the column of gas is proportionately decreased. The internal pressure of the particles of gasoline easily breaks the particles and vaporization takes place. As the gas passes on into the mixing chamber its velocity is decreased and the pressure therefore increased. Though it was the decreased internal pressure of the gaseous that brought about vaporization, increased pressure alone will not liquify the gas instantaneously. When any liquid evapo-

rates it absorbs heat or its internal temperature is decreased; that is, water must be heated in order to change to steam and liquid air evaporates if it is allowed to come in contact with any substance from which it can absorb heat; so when the gasoline is held as a vapor its temperature drops and it absorbs heat from the walls of the mixing chamber.

With the general type of carbureter the venturi tube forms the partition between the mixing and float chambers, and the gasoline in the latter is subjected to atmospheric pressure through a small hole. When the engine is not running the space above the gasoline in the float chamber is filled with air of normal humidity. When the engine is started this air is subjected to the cold surface of the venturi tube. Just as dew forms when the grass cools and as water forms on a pitcher of ice water, so globules of water form in the carbureter and trickle down into the gasoline, whence they are drawn into the spraying jet and make many a jolly ride unpleasant.

The remedy is obvious. It would be impractical to keep the humid air out of the carbureter, as it is due only to the pressure of this air that the gasoline is forced out of the jet. The real remedy, not only to prevent water vapor condensation in the float chamber, but none the less to promote rapid and thorough vaporization of gasoline within the venturi tube is the use of a hot water or exhaust gas jacket, which often is applied to a carbureter by the maker or designer and never connected up by the user.

The point of this article is a long way around, but the idea is that most of the water in many cases does not go in with the gasoline, but is formed in the carbureter.—Jenny Rator.

Adjustment of Carbureters

Constructional Device Used on Pierce-Arrow Cars Described—

Same Idea Continued from 1908

BUFFALO, N. Y.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions:

1—What is the construction and how are the adjustments made on the carbureter of the Pierce-Arrow car?

2—Has its design been changed much since the Pierce-Arrow company made its four-cylinder car?—S. F. Wie.

1—Fig. 1 shows a section through the automatic Pierce-Arrow carbureter. The constant level gasoline chamber is concentric with the spray nozzle A. This chamber is in communication with the gasoline supply tank which is on a higher level. The float A is annular; and it serves to keep the height of the gasoline at the spray nozzle constant at whatever normal inclination the car may stand and regardless of the amount of fuel in the gasoline supply tank. This height should be $\frac{1}{8}$ inch below the top of the nozzle, the opening in which is regulated by the needle valve B. When the gasoline gets below this level the float drops, raising by means of a lever the float valve C, thus allowing the gasoline to fill up the chamber to its proper level.

The gasoline line from the supply tank passes through the fine gauze strainer D. This prevents water and dirt from entering the float chamber. The strainer is secured to the plug P and this plug should be withdrawn occasionally to allow the water and dirt to be drained off. There is also a drain cock at the end of the pipe leading to the carbureter which should be opened once a month for a few seconds to drain off any water that may have accumulated therein.

When the engine is running slowly, the throttle valve E is just barely open, and the auxiliary air reed valves F are on

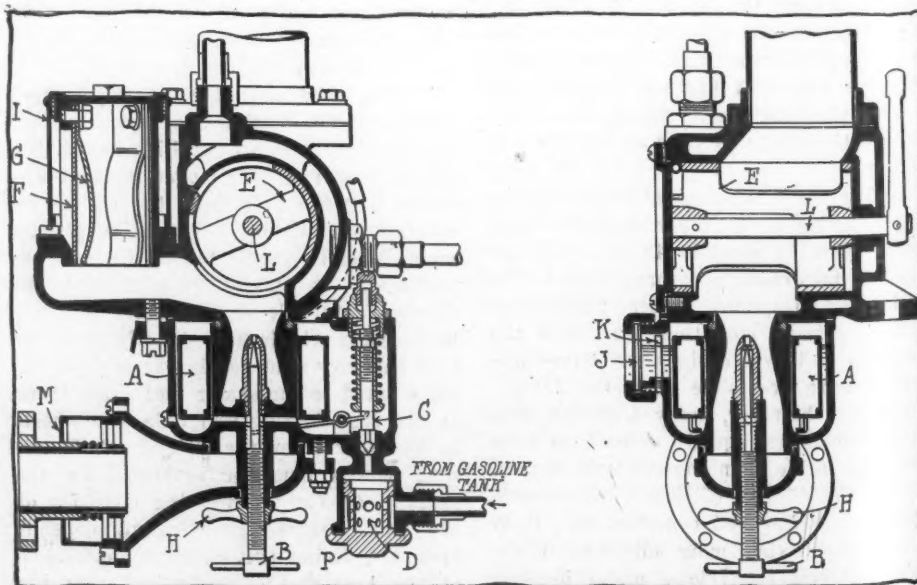


FIG. 1—SECTIONAL VIEW OF PIERCE-ARROW CARBURETER

Motor Laws of Minnesota

Uniform Light Regulation One That Is Welcomed by Non-Users of Cars As Well As Motorists

their seats. All the air is taken in at the lower inlet, and coming from the proximity of the exhaust pipe it is warm. It passes up the contracted passage around the spray nozzle at a high speed and so vaporized the gasoline which is drawn from the nozzle. When the engine runs faster the more intense suction opens the light auxiliary reed valve F, admitting air above the spray nozzle. When the engine runs still faster a heavier reed valve G is open admitting still more air. In replacing these valves, care must be taken to have them fit snugly all around their seats, with the slightest pressure possible. The supplementary springs G form gradual stops of progressive strengths to the reed valves. When the needle valve D is once adjusted and locked by means of the nut H it is not likely to require any further attention. The wire gauze screen I around the auxiliary air inlet valves should be removed occasionally and cleaned out. There also is a wire gauze screen on the front of the air pipe near the exhaust pipe, this also should be kept clean. If these screens become clogged with dust and dirt the engine will not run properly.

There is a glass window J provided in the float chamber to show at a glance the height of the gasoline therein. This should be level under normal conditions with the notch on the vertical spindle K. Occasionally one should remove the cap P from the bottom of the float chamber as all dirt and water in the gasoline collect there. All connections between the carbureter and motor should be perfectly tight. There is a hot-water-jacket around the mixing chamber and the pipe leading to this jacket has a cock in it which may be closed in hot weather, but should be full open in cold weather. The spindle L of the throttle valve should be oiled occasionally to prevent wear at this point, for should the bearings become warm sufficient air might be admitted to prevent the motor from running regularly at slow speeds. In hot weather the air regulator M should be open fully, to admit cool air around the spray nozzle. In cold weather this should be closed. The gauze screen on this should be kept clean. The needle valve adjustment B in the spraying nozzle is practically the only adjustment on the carbureter and to operate this one has but to start the motor, loosen the lock nut H, then turn the adjusting screw B slightly in one direction or another, noting the point at which the motor runs best, the lock nut then should be tightened by the operator.

2—This carbureter is identical in design with the carbureter used on the four-cylinder Pierce cars of 1908-9.

S AUK CENTER, MINN.—The legislature last winter passed some good laws regarding the motor car and those who operate it. A person owning a car will have to pay \$1.50 for his license on and after January 1, 1912, and this license will be good for 3 years from the date of issue, January 1, 1912. This will help us out a little on them.

Also an examining board will pass upon licensing of chauffeurs only, and parties who own or operate their own cars will not be asked by the secretary of state to pass an examination before licensing, as has been stated by parties who did not understand the laws relating thereto. It also passed a law preventing persons under 16 years of age from driving a motor car unless accompanied by the owner or a licensed chauffeur. A chauffeur must be 18 years old or over before he can get a license to operate a motor car upon the public highways of the state. The speed limit is fixed at 25 miles per hour, and in cities where the traffic is more or less congested 10 miles per hour for a distance of 40 rods only at this rate, and 15 miles per hour in the residence portion for a distance of 40 rods. Turning corners at 6 miles per hour only is the law.

On overtaking vehicles upon the public highways the one so overtaking shall turn to the left and the one so overtaken shall turn to the right, giving one-half of the road. The law also provides that no village or city within the state shall pass any rules or regulations regarding speed of motor cars either in limiting or restricting them.

The practice of boys and other persons of tampering with cars standing at rest by the curb is expressly forbidden, and it is a misdemeanor to touch any crank, levers, horn, wheel or any part of such car, and also it is strictly forbidden to allow any motor to run while unattended by the driver; in other words, a driver must stop his motor when he leaves the car, if only 1 minute. This is entirely right, as it pre-

vents some meddlesome boy perhaps damaging the car or property by "just seeing what that lever was for."

The other parts of the laws are about the same as formerly enacted, with slight changes. One part of the laws regarding the use of lights on all other than motor vehicles is a step in the right direction, although I am firmly convinced that this part of the laws as passed relating to the use of motor vehicles will meet with some opposition in certain communities, but will be of great benefit to all parties concerned.

In clear language all vehicles, other than self-propelled, shall carry a white light that can be plainly seen from front and rear of such vehicle, on and after January 1, 1912, and the same law referring to the motor lights will apply to these same vehicles. Now a farmer or traveling man, or any other person or persons, who shall drive any vehicle other than self-propelled, shall 1 hour after sunset and 1 hour before sunrise, exhibit a white light on such vehicle, that can be plainly seen from front and rear, and such neglect on the part of such person or persons shall act as a waiver of damages in case of accident on the public highways of this state.

I have talked with leading farmers, doctors and liverymen, and they all agree that the law is a decidedly wise one, and will be the means of preventing many serious accidents, as a motorist will be protected by the visible light telling him what is ahead, and also by the waiver of damages in case of refusal of the damaged vehicle owner to comply with the law relating thereto, and the other parties will have most certain protection if they gracefully acquiesce and fit up for night driving, being sure that no harm will come to them, their wives and children, if the light is properly displayed on their carriage, wagon or cart.

No motorist will, knowingly, run into any vehicle if he can avoid it, as he well knows it means a large repair bill for him as well as damages. There are, however, some parties who look upon the law as passed as class legislation, but such is really not the case, but a law long in use in a great many states, and all parties, so I am informed, are much pleased with the results gained.

One representative in the last legislature told me that the law was a joke, and sneered at me when I wanted him to introduce such a bill when he was a member of the legislature, and told me the other day that "nobody would pay any attention to it." This same man owns a horse that you could run over with a motor car, day or night, and if such an accident occurred he would want highest damages, I am certain. He thinks it right for the motorist to carry lights, but not right for the other vehicles, but it seems he was in the minority, for the fact is an approved law and will be respected by the great majority of men.—A. D. Carpenter.

Notice to Correspondents

Motor Age has received communications addressed to the Readers' Clearing House from the following named towns and nom de plumes: Dayton, O.—A Subscriber. Racine, Wis.—A Reader. Cincinnati, O.—A Reader. Jackson Center, O.—C. B. Santa Barbara, Cal.—P. P. B. Isanabrock, N. Dak.—A Subscriber. Detroit—O. W. P. Des Moines, Ia.—D. C. G. Townsend, Mont.—Subscriber. These communications will be held until the proper signatures have been received. All communications written over a nom de plume must bear the writer's signature, otherwise such communications will not be answered. These signatures are wanted as proof of the authenticity of the inquiries.—Editor Motor Age.



From the Four Winds



MORE Speedway Entries—Two Nationals have been entered in the 500-mile race at the Indianapolis speedway, bringing the total up to nine. Herriek, Merz, Herr and Wilcox are the drivers named.

Abbott Quits Contests—The Abbott Motor Co. has announced the withdrawal of its racing team from future contest work. The company's action grows out of the A. A. A.'s ruling that it violated rule 75A by advertising the achievements of its stock cars in the Savannah speed contests last November.

Cole May Quit Contests—It is said that the Cole Motor Car Co., of Indianapolis, manufacturer of the Cole, will not re-enter the racing game in 1912. Although no official announcement of this move is made at the Cole factory, the plans of the Cole agents to have the funds that have been used for racing purposes put into the service promotion departments will probably carry.

Policeman Uses His Own Car—Spokane has a police officer who owns his own motor car and uses that machine to respond to calls that are transferred to him from headquarters. The officer is John Frese. Frese for some time has been motor cycle officer during the summer months, but as winter approached he discarded the motor cycle for the car on account of the deep snow.

Would Raise Club Dues—The members of the Worcester Automobile Club, of Worcester, Mass., have voted to amend the by-laws of the organization so that they would call for a raise in the annual dues of the club to \$30 a year. The present dues are \$20. In approving of the amendment the officers had in view a number of improvements to the present headquarters in the Chase building.

Encouraging Road Building—At the annual meeting of the Albert Lea Automobile Club, of Albert Lea, Minn., premiums were offered for best roads in Freeborn county. Money will be spent by the club on bad stretches of road. New officers are: President, Henry Soth; vice-president, W. G. Chamberlain; secretary, Clint L. Luce; governors, D. C. Armstrong, Ludwig Kemper, Dr. O. A. Watland and Martin Blackland.

Helping the Truck Men—Following upon the report of State Superintendent of Public Works Charles E. Treman to the effect that immediate action is demanded to adopt public bridges and highways throughout New York state to the growing needs of the commercial vehicle, comes the announcement that the board of governors of the Touring Club of America has established a commercial vehicle department, which will be conducted on

broad lines for the benefit of manufacturers as well as users of motor trucks. It will endeavor to have the roads sign-boarded and the bridges kept in condition.

Trout Lake's New Officers—The Trout Lake Good Roads Club, of Washington, has elected the following officers: President C. A. Pearson; vice-president, A. G. Belsheim; secretary-treasurer, William Coate.

Early Road Race Scheduled—Arrangements are being made to hold a road race from Tucson to Phoenix, a distance of 120 miles over desert and valley roads, at an early date. A silver loving cup and cash prizes will be offered. A Mitchell, Buick and Flanders already have been entered.

Like Sproul Road Act—Since the Sproul road act went into effect last summer, State Highway Commissioner E. M. Bigelow has received 110 applications from twenty-eight of the sixty-seven counties in Pennsylvania for the improvements of sections of highway under the state aid plan. The applications for the improvement of a total of more than 270 miles. Counties and townships jointly applied for the improvement of 1,374,107 feet or more than 260 miles; counties and boroughs jointly applied for the improvement of 52,280 feet or almost 10 miles.

Exit Point Breeze—The Philadelphia driving park property and the historic old Point Breeze race track has been conveyed by Hugh McAnany to F. C. Folwell, the latter acting in the capacity of agent for a realty company which purposes, it is said, to reconstruct the property into a huge outdoor amusement place. The property comprises approximately 63 acres, encircling which is a 1-mile dirt track. Both the Quaker City Motor Club and the Philadelphia Automobile Trade Association have conducted numerous successful race meets there.

Road Movement in Ohio—A paved road-way along the well-traveled route from Cincinnati to Toledo, O., to extend between the cities of Troy and Piqua, will be one of the epoch-making incidents in the good roads movement in Ohio next summer. The road probably will be either concrete or brick, and the farming population is working hand in hand with the motor enthusiasts in a manner that shows the community's intelligence and esprit de corps. The significance of the project lies in its power for further good. It will be the pioneer paved pike in the wonderfully prosperous and beautiful Miami valley. It is sure to cause all counties in the state to emulate the improvement—not with strawberry ridge pikes, scraped mud roads, etc., but with perfect reaches of

boulevard like Massachusetts boasts, bringing the motoring people to western Ohio to gladden their journeys and giving respite to the farmer from the dust of macadam or other quasi-perfect structure.

Freeport Questions Law—The Freeport Automobile Club, of Freeport, Ill., has decided to organize and engage an attorney to fight the motor law in Illinois. It is asserted that the statute is unconstitutional and that the license fee cannot be legally collected. It is planned to ignore the law and, if anyone is arrested, to take the case up to the highest courts. The law governing the examination of chauffeurs also is criticised and may be fought.

Hamilton Club Election—At the annual election of officers of the Hamilton Automobile Club, of Hamilton, Ont., S. B. Cunningham was elected president. Other officers elected included vice-president, J. H. Kerr; second vice-president, W. D. Wilson; secretary-treasurer, M. J. Overall; auditor, S. D. Biggar; club surgeons, Drs. Olmstead and Rennie. The membership in the club increased during past year from 104 to 178. Addresses of importance to the trade were delivered by various members of the club.

Railroad Tries New Scheme—In an effort to cut down the expenses of calling its trainmen for their runs over the road, the Pennsylvania Railroad has started an experiment in Harrisburg, Pa., of calling its men with the use of motor cars and dispensing with the call boys. Officials figure that the company will be able to save approximately \$5,000 annually with this system, providing the motor cars do not cause delays enough to make the trains late in leaving their terminals. Both the Philadelphia and middle division men are being called with the use of motor cars.

Chauffeurs Fighting Law—Declaring that chauffeurs are being discriminated against, the Buffalo Chauffeurs' Club, through its attorney, Charles J. Staples, has taken steps to test the validity of that section of the New York motor vehicle law requiring chauffeurs to have state licenses. At his own request Theodore Meinhart, of Buffalo, a member of the club, was arrested for violation of the law. Secretary of State Lazansky then was notified that the Buffalo chauffeurs intend to test the constitutionality of the law. According to Attorney Staples, chauffeurs declare that all or no operators of motor vehicles should be licensed. As the law stands now, licenses only are required for the chauffeur who operates his motor car for hire. This license costs \$5 each year. The chauffeurs desire that the owners of cars be taxed likewise. They claim that it is the unskillful operator who causes the

accidents. Attorney Staples advises Buffalo chauffeurs to take out their licenses early in February under protest. If the law is declared unconstitutional, actions then will be begun to recover the fees paid for the licenses.

Revive Credit Association—The Spokane Tire Dealers' Credit Association has been reorganized. The association was organized last spring with monthly meetings, but interest waned. Hereafter the members will meet twice a month.

Milwaukee Will Have Paper—Plans are being made by the Milwaukee Automobile Club for the issuance of a monthly newspaper in bulletin form, similar to the publications of motor clubs in Chicago, Buffalo and other cities. The club is growing rapidly and the need for a medium has become not only desirable but pressing. According to present plans, the editorial management will be placed in the hands of Leonard E. Meyer, secretary of the club.

Fort Wayne on Minor Circuit—The Fort Wayne Auto Show Association, composed of the motor car dealers and allied interests of Fort Wayne, Ind., is arranging to hold a motor car show in that city February 29 and March 1 and 2. The show will be held in the Princess rink and it is expected about sixty cars will be on exhibition.

Holds It's Class Legislation—It has been held by the city legal department of Indianapolis that an ordinance forbidding the use of any kind of a noise making device on a motor car or motor cycle except a bulb horn would be invalid, because it would be class legislation. An ordinance seeking to limit noise-making devices to such horns has been stricken from the files of the council. The Klaxon company took an active part in the fight against the proposed ordinance.

After the Toll Roads—State Highway Commissioner E. M. Bigelow of New York will insist that owners of toll-road franchises or rights connecting with sections of public road suggested for improvement be surrendered to the commonwealth before any construction work is done. The commissioner laid down this principle when he gave notice to a delegation from Bucks county that roads would not be fixed up where the improvements were going to result in increased traffic and consequent growth in income for toll roads. The commissioner has been looking into the state of toll roads about the state, using the data prepared for the legislature and the engineers who are making surveys for improvements of roads under the \$50,000,000 loan are examining the condition of the comparatively few highways where gates exist. It is believed that through pressure of public opinion fran-



SUSPENSION SEATS OF GERMAN DESIGN

NEW TYPE OF CAR SEAT

At the recent show in Berlin, Germany, there was shown a car fitted with suspension seats which permits of the use of the unit compartment body. There is only one front seat, that being for the driver, who sits in the center of the car, with the steering column also in the center. Back of him are two more seats, while in the rear of those is another, making a four-passenger car. The main idea of this body type is found in the suspension seat, which is shown in the illustration at the top of the page. There are only two fixed points of rest supported by the springs.



NEW BODY WITH SUSPENSION SEATS

chises will be surrendered and rights dedicated to the state in many sections, and where it is necessary the commissioner can invoke the drastic provisions of the Sproul main highway law.

After Car Thieves—The Denver Motor Club has offered a standing reward of \$50 for the arrest and conviction of anyone stealing accessories or equipment from cars standing in the streets.

New Georgia Club Thriving—The Automobile Club of Georgia has applied for a charter and as soon as one is secured will close for a building in Atlanta. It is likely that a location on Peachtree street, next to the Piedmont, will be secured.

New Kind of a Record—The first instance of a motor car being hit by a man is reported in the police blotter at Milwaukee, Wis. In making the report of an accident in which William Rathberger walked into the car of Hans Clauson, the patrolman headed it "Motor Car Hit by Man."

New York Against Fair Meet—The New York state fair commission met at Albany last week and practically decided not to authorize motor car races at the state fair to be held in Syracuse next September. The accident at the last fair, when Lee Oldfield's car skidded and killed or injured several people, is of course responsible for this.

Election at Spokane—The Spokane Automobile Dealers' Association has enthusiastically indorsed the opening of a national highway from east to west along the northern route. The following officers were elected at the annual meeting of the dealers' association: L. W. Hodgins, president; H. J. Banta, vice-president; Harry G. Hawkins, secretary; A. H. Brown, treasurer.

Louisville Dates Changes—The fifth annual exhibition of the Louisville Dealers' Association, which is to be held in the First Regiment armory, has been postponed from February 21-24 to March 6-9. The 1912 show is scheduled 2 weeks earlier than last year. According to present plans for decorations, the main aisle will be lighted with pedestal electric lamps, imitative of the light standards on the Long White Way in this city.

School for Road Men—Under a law passed at the last session of the Ohio general assembly, State Highway Commissioner James R. Marker must hold a school of instruction in road and bridge construction at least 1 day in every county of the state of Ohio. Commissioner Marker has started these meetings and will continue in this work for the coming 5 or 6 weeks. The county commissioners, county engineer, trustees of the various townships and superintendents of each road district must attend the instruction.

MOVES to Detroit—George W. Franklin has been appointed manager of the Regal Motor Sales Co., of Detroit, and manager of the entire Michigan district, with headquarters in the Regal salesrooms on Woodward avenue.

Change Office Location — The H. W. Johns-Manville Co. has found it necessary to move its Louisville offices from the Lincoln Savings Bank building to 205 Paul Jones building. The office will be in charge of J. R. Chowning. A line of J-M asbestos and magnesia products, electrical supplies, packings, pipe coverings, roofings, etc., will be handled from this office.

Galion May Get a Plant—Prospects are bright for the establishment of a plant at Galion, O., for the manufacture of motor trucks, according to the statements made by the leading citizens. President H. W. Woodward and Secretary W. M. Hager, of the Cleveland Motor Truck Co., is negotiating for the consolidation of that corporation with the Howard Motor Car Co., of Galion.

At Last a Dividend—After being in operation for nearly 40 years, the Atlas Mfg. Co., of Fostoria, O., has declared its first dividend. It remained for the dividend to come after the company had tried about everything else and about a year ago entered the motor car crankshaft manufacturing business. Much of the stock of the present owners was acquired at from 10 to 25 cents on the dollar.

France Investigating Mexico—Jean Giraud, of Paris, France, has been investigating the situation in Mexico as the representative of a syndicate of French people who contemplate establishing a large factory at some point in Mexico for the manufacture of motor cars. It is stated that not less than one million dollars gold will be invested in the enterprise if Mr. Giraud's report is favorable.

Election at Bucyrus—At the annual meeting of the stockholders of the Sommer Motor Co., of Bucyrus, O., the following were elected directors; L. A. Sommer, W. H. Reedy, W. N. Baker, A. Russman and A. Leuthold. President Sommer in his report to the stockholders said the company had a bad year, owing to the removal of the factory and some difficulties over financing the site proposition. He said that the company now has \$200,000 worth of business in 1912 contracts.

A Show Diversion—By way of diversion during show week a challenge was issued by Joseph A. Hudson, president of the Automobile Co., of Philadelphia, to Harry Houdini, self-styled handcuff king, appearing at Keith's theater, to escape after being chained into the skeleton of a Marmon car by experts of the company. The challenge was accepted and Houdini accomplished the feat. He was handcuffed and chained to the chassis by divers handcuffs, leg chains and neck chains, but in about 15 minutes, by some method known only to himself, extricated himself

Among the Makers



KANSAS CITY BRANCH OF BUICK MOTOR CO.

Coming Motoring Events, Including List

Philadelphia
January 13-27—Show of Philadelphia Automobile Trade Association, Philadelphia, Pa.

Detroit
January 22-27—Show at Detroit, Mich.; Detroit Automobile Dealers' Association; W. R. Willmot, manager, 501 Bowles street, Detroit, Mich.

January 22-27—Show at Providence; Rhode Island Licensed Automobile Dealers' Association; Arthur S. Lee, manager, 52 Richmond street, Providence, R. I.

January 22-27—Fourth annual Show, Rochester, N. Y. C. A. Simmons, manager, 230 William street.

Chicago
January 27-February 10—Eleventh annual show, Coliseum, Chicago; National Association Automobile Manufacturers, S. A. Miles, manager, 7 East Forty-second street, New York. Pleasure cars, January 27-February 3; commercial, 3-10.

January 27-February 10—Annual show, Pittsburgh, Pa.; Automobile Show Dealers' Association of Pittsburgh. Pleasure cars, January 27-February 3; commercials, February 3-10.

January 29-February 3—Second annual show, Scranton, Pa.

FEBRUARY
February 1-7—Tentative dates for show at Washington, D. C.
February 3-9—Show at Albany, N. Y.
February 3-10—Show at Harrisburg, Pa.
February 3-10—Show at Montreal, Canada; Automobile Club of Canada.

February 5-10—Show of Automobile Dealers' Association of Wilkes-Barre; R. A. Rosenkrans, 37 West Market street, Wilkes-Barre, Pa., secretary.

February 5-12—Show at Buffalo, N. Y.; G. C. Fehrman, manager, 755 Ellcott square.

February 5-17—Annual exhibit, St. Louis; F. W. Payne, manager, St. Louis, Mo. Pleasure cars, 5-10; commercials, 12-17.

February 10-17—Show at Atlanta, Ga., of Atlanta Automobile and Accessory Dealers' Association; Homer C. George, manager.

February 12-17—Show at Troy, N. Y.

Kansas City
February 12-17—Show at Kansas City, Mo.; Wallace J. Terry, manager, 302 Long building, Kansas City, Mo.

February 12-17—Show at St. Paul; St. Paul Motor Car Dealers' Association; W. R. Willmot, manager.

PITTSBURGH
February 12-19—Dayton, O., show; Elmer C. Redelle, manager, Dayton, O.

February 13-17—Show at Grand Rapids, Mich.

February 17-24—Pittsburgh show; Pittsburgh Automobile Show Association, T. I. Cochran, manager, Pittsburgh, Pa.

February 17-24—Show at Newark, N. J.; New Jersey Automobile Exhibition Co.

February 17-24—Cleveland show; Cleveland Automobile Show Co., F. H. Caley, manager, Cleveland, O.

Minneapolis
February 17-24—Minneapolis show; Minneapolis Automobile Show Association; H. E. Pence, manager, Minneapolis, Minn.

and smilingly bowed to the astonished audience. Perhaps the most astounded of all were the mechanics who fastened the locks.

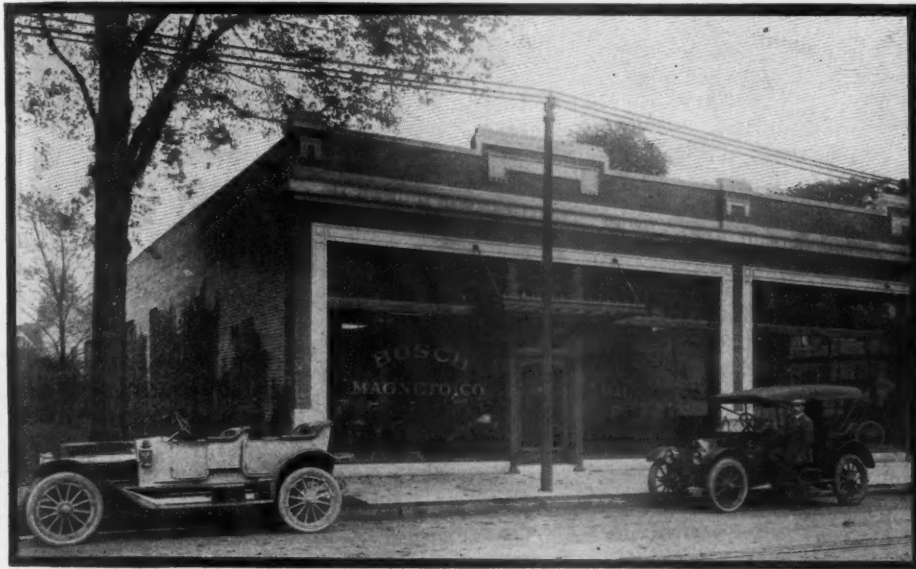
Negotiating With Wapakoneta — The Thompson-Breese Auto Plow Co., a company organized to manufacture tractors for farm use, is negotiating for a site at Wapakoneta, O., upon which it proposes to erect a plant.

Johnson Company Election—August H. Vogel has been elected a director of the Johnson Service Co., to succeed Professor Warren S. Johnson, president and general manager, who died in Los Angeles a short time ago. Carl F. Johnson, a son of the

late president, and Frank R. Bacon, president of the Cutler-Hammer Mfg. Co., of Milwaukee, were elected directors to fill vacancies. The election of officers will be held in April.

Curbing Garagemen—Following the complaints made to alderman in Syracuse, N. Y., by hotel proprietors, of annoyance caused by too great activity among garage representatives in soliciting the business of tourists registering at Syracuse hostleries, an ordinance has been introduced in the common council forbidding "undue activity" in this line. The ordinance aims to stop "solicitation orally and by cards" of business, though at the

and Dealers



DETROIT BRANCH OF BOSCH MAGNETO CO.

of Dates Selected for Shows of the Winter

February 19-22—Show of Minneapolis Automobile Dealers' Association, Minneapolis, Minn.

February 19-24—Show at Hartford, Conn.; Automobile Club of Hartford.

February 19-24—Seventh annual show of Omaha Automobile Association, C. G. Powell, manager, Omaha, Neb.

Cincinnati

February 19-25—Annual pleasure car show; Cincinnati Automobile Dealers' Association, E. A. Kruse, secretary, Cincinnati, O.

February 20-24—Show at Binghamton; Automobile Dealers' Association; R. W. Whipple, secretary, Binghamton, N. Y.

February 20-25—Show of Automobile Dealers' and Traders' Association, New Orleans, La.

Baltimore

February 20-28—Annual show, Baltimore, Md.; Baltimore Automobile Dealers' Association.

February 21-28—Toronto show; Toronto Automobile Trade Association; F. I. Fox, secretary, Toronto, Canada.

February 20-28—Annual show, Baltimore, Md.

February 22-24—Show at Bloomington, Ill.
February 24-March 2—Annual show; Brooklyn Motor Vehicle Dealers' Association, Brooklyn, N. Y.

February 26-29—Annual commercial exhibit; Cincinnati Automobile Dealers' Association, E. A. Krause, secretary, Cincinnati, Ohio.

February 26-March 2—Show at Paterson, N. J.; Paterson Automobile Trade Association.

February 26-March 2—Second annual show

Elmira Automobile Club, L. Blumenstein, manager, Elmira, N. Y.

February 26-March 2—Show at Sioux City, Ia., of Sioux City Automobile Dealers' Association.

February 26-March 3—Mississippi Valley show, Quincy Automobile Club, Quincy, Ill.; Harry F. Hofer, director.

February 28-March 2—Annual Davenport show; Woodworth Club, manager, Commercial Club building, Davenport, Ia.

MARCH

March—Show at Norfolk, Va.

Boston

March 2-9—Pleasure car show, Boston; C. I. Campbell, manager.

March 4-9—Show at Des Moines; C. G. Van Vleet, secretary, Des Moines, Ia.

LOUISVILLE

March 6-9—Fifth annual show at Louisville, Ky.; Louisville Automobile Dealers' Association.

Denver

March 4-9—Show at Denver; G. A. Wahlgreen, manager, Denver, Colo.

March 6-9—Advertisers' motor show, Tiffin, O.

March 11-16—Show at Cedar Rapids, Ia.; M. P. Beck, manager.

March 13-20—Show of Boston Commercial Motor Vehicle Dealers' Association, Mechanics' building, Boston; C. I. Campbell, manager.

March 12-16—Show at Syracuse, N. Y.; Syracuse Automobile Trade Association; Syracuse, N. Y.

APRIL

April 6-13—Show at Ottawa, Ont.; Ottawa Valley Motor Car Association.

same time it is stated that the rights of chauffeurs under the general statute will be conserved. Just where the line will be drawn it is hard to say. The proposed ordinance is the result of personal encounters among chauffeurs last summer.

Velie Truck Factory Ready—The new truck factory of the Velie Motor Vehicle Co., of Moline, Ill., will be occupied within a few weeks and will form the headquarters of the truck branch of the Velie plant. New machinery has been installed and the plant will be in operation within a short time. Motor parts as well as parts of pleasure cars will be manufactured at the new factory building and assembled at

the central plant. The new building is 40 by 100 feet in dimensions and one story in height.

Moline Increases Stock—The Moline Automobile Co., of Moline, Ill., has increased its capital stock from \$100,000 to \$500,000, the amendment to the articles of incorporation stating that the increase was to care for general increase in business.

Water Damages Plant—Considerable damage was done at the plant of the Hart-Kraft Motor Co., at York, Pa., when a number of the water pipes in the building burst and flooded the three floors of the factory. Some of the workmen of the company worked all day Sunday repairing

the damage done by the water. The accident happened during the present cold spell and the thermometer registered 23 degrees below zero during the night.

Entertains Dealers—Manager F. P. Corbett, of the United Motor-Columbus Co., agent for the Maxwell and Columbia in central Ohio, gave a banquet to the dealers in his territory at the Chittenden hotel, Columbus, O.

Bruce Joining Halladay—C. Arthur Bruce, formerly treasurer of the A. O. Smith Co., of Milwaukee, Wis., has become treasurer of the Streater Motor Car Co., of Streater, Ill. He succeeds Mr. A. L. Goetzman.

Chicago Republic Manager—John W. Maguire, formerly of Toledo, has been appointed manager of the Chicago branch of the Republic Rubber Co., succeeding John H. Kelly, now manager of the company's motor tire department at the factory, at Youngstown, O.

Akron Wants a Show—At a meeting of the committee of Akron motor enthusiasts to give a motor show, the organization was completed by the election of Cliff Counsellor, chairman, and O. L. DeWeese, secretary. According to the plans adopted the show will be held in February.

Cino Plans—Haberer & Co., of Cincinnati, makers of the Cino, have decided to use a 117-inch wheelbase on their four-cylinder touring cars, while the overhead valve motor will be used in the racing roadsters and such touring cars as require them, being interchangeable with the T-head motor.

Show for Evansville—Motor car dealers of Evansville, Ind., have arranged to hold their motor car show in a building in Locust street. The building is 50 by 160 feet and there will be accommodations for approximately fifty cars, together with a number of motor cycles and sundries. The show will be held January 22 to 27.

Matheson Branch Not Involved—The Matheson Automobile Co., of Boston, against which bankruptcy proceedings were started recently, has no connection with the branch which the Matheson Automobile Co., of Wilkes-Barre, Pa., has established in the Hub. The concern which is involved has been out of business 4 years and only was an agency.

Moving Rumor Denied—Recent rumors that the Warner Mfg. Co., of Toledo, Ohio, was about to build a large plant at Muncie, that the Warner Mfg. Co., of Toledo, Ohio, about to build a large plant at Muncie, Ind., are denied. T. W. Warner authorizes the statement that such is not the case, and says the Warner Mfg. Co. has no intention whatever of establishing another factory in Muncie. The T. W. Warner Co., of Muncie, Ind., however, is building a new plant and making considerable additions to its equipment, and undoubtedly this fact was the basis of the rumors in regard to the Warner Mfg. Co., T. W. Warner being the head of both concerns.

Magneto Makers Have Made Progress

(Continued from page 75)

forms only each alternative current wave. Inasmuch as the cam lifts the breaker arms but once in every revolution, the breaker-arm springs require but one-half the tension of those required to operate at twice the speed, consequently the wear on these parts is considerably reduced. It also is claimed that by placing the condensers directly over and very near the circuit-breakers, burning and pitting of the platinum points is eliminated.

Instead of distributing a high-tension current to each plug individually and returning through a ground, with this ignition system two spark plugs are connected in series. This produces a spark in two cylinders at the same time, one spark being timed to occur in a cylinder on its compression stroke and the other in a cylinder at the end of its exhaust stroke. The spark in the exhausted cylinder is supposed to have the double advantage of cleaning the plug and at the same time intensify the spark in the cylinder which is ready to fire, this latter being according to the theory of the spark gap. The construction of the magneto is comparatively simple, there being no gearing and only two annular ball-bearings for which suitable lubricating facilities are used.

Herz—The most important features of Herz magneto construction for the season of 1912 are its thorough means of protecting the magneto from dust and moisture and effectively insulating all exposed secondary connections; the new automatic timing device, which is applicable to all makes of magnetos having no such device without change of design or construction; and the addition of a new motor cycle magneto which is almost identical with the motor car model, but smaller. The most interesting and novel feature of the firm's exhibit is an ingenious demonstration of the improved automatic timing adjustment. This device in itself is very simple.

It consists of a coupling, Fig. 44, consisting of two juxtaposed disks, which is interposed between the magneto and the driving shaft. Each of the disks is provided with six curved grooves running in the opposite direction to those in the other disk; and the disks are coupled together by means of six balls running in the grooves. At the same time these balls act like the weights of a governor, being forced outward from the center, by the centrifugal force, to an extent corresponding to the speed of the motor; and in this way a twist is imparted to the armature shaft of the magneto in relation to the main driving shaft.

Herz magnetos are of the high-tension compound armature type requiring no auxiliary coil, and they are neat and compact in design and construction.

A small compact high-tension magneto

for motor cycles also is a feature of the Herz line for 1912.

Duplex—A magneto which supplies either a high-tension or a low-tension current for use in connection with combination jump-spark, and magnetic make-and-break plugs, respectively, is the feature of The Duplex Magneto and Spark Plug Co.'s line for the season of 1912. This magneto has a single winding on its armature, a primary, but it also uses in connection therewith a small transformer coil, which is secured to the front end of the apparatus just below the distributor, in the position generally occupied by the circuit-breaker box. The machine has a double distributor from which one set of wires lead to the magnetic make-and-break terminal of the plug, Fig. 43, and the other set of wires to the jump-spark terminal of the same plug.

The Duplex company also makes a dual high-tension magneto for jump spark ignition only. This apparatus has a compound wound armature and a small transformer coil secured to it in the same manner as the machine described above, which is used

Too Late to Classify

Herewith Motor Age briefly presents specifications of pleasure cars received too late to be included in the tables recently published:

Michigan—Four cylinders; 4.25 and 5.25 inch bore and stroke developing 28.9 horsepower; 297.8 piston displacement; dual system Briggs magneto; wheelbase 116 inches; tires 34 by 4 front and rear.

Norwalk 45—Four cylinders; 4.25 inch bore and 5.50 inch stroke; 28.9 horsepower and 312 cubic inches piston displacement; cylinders are L-head type cast separately; cooling is by pump through a tubular radiator; Schebler carburetor; dual Splitdorf magneto; oil is forced to bearings; wheelbase 124 inches; tires 36 by 4 front and rear; front springs semi-elliptic, rear three-quarter elliptic; front axle is an I-beam drop forging; multiple disk clutch, faced with steel and raybestos, located on the flywheel; selective 3-speed gearset in unit with motor; shaft drive; floating rear axle; brakes internal; ball bearings in gearset, front wheels, rear axle and steering gear; plain bearings in crankshaft.

Norwalk, six-cylinder—Bore 4 inches, stroke 5; horsepower 25.6; piston displacement 251.3; cylinders valve-in-head type cast in pairs; Stromberg carburetor; 136-inch wheelbase; 40 by 4½ inch tires front and rear; springs semi-elliptic; other specifications same as the 45.

Nyberg 36—Four cylinders 4.13 by 5.25 bore and stroke; S. A. E. horsepower 27.3 and piston displacement 280.6; cylinders are of the L-head type cast separately, with valves located on the side; cooling is by centrifugal pump and a honeycomb radiator; a dual high-tension Remy magneto is the current source; carburetor is Schebler gravity feed; motor is lubricated by splash system; wheelbase is 116 inches; tires 34 by 4 all around; front springs semi-elliptic, rear three-quarter; front axle is I-beam; clutch is multiple disk with steel and raybestos friction surfaces; gearset three-speed selective in unit with motor; rear axle floating; shaft drive through torsion tube; brakes are internal; plain bearing crankshaft; steering knuckle and steering gear; ball bearings in gearset, front wheels and rear axle.

Nyberg 6-60—With the exception of a six-cylinder motor developing 40.9 horsepower, piston displacement of 430.8, wheelbase 136 inches and tires 37 by 4½ front and rear, the specifications are the same as the 36.

to step up the battery current. Realizing that accessibility is a feature of vital importance, the Duplex magnetos are so constructed as to make most accessible those parts which at times should be inspected by the owner of the machine. The most important of these parts is the interrupter or circuit-breaker and its platinum points. In the Duplex they are placed on top, between the magnets and the distributor plate, where they cannot be fouled by oil and are easily accessible for inspection or adjustment.

Michigan—The Michigan magneto is a low-tension or primary armature type in which a non-vibrating coil is employed to transform the current into the high-tension required to jump the gap at the spark plugs. A sectional view of the Michigan magneto is shown in Fig. 22. The armature is of laminated design with a single primary coil wound upon it and it is mounted on imported F. & S. ball bearings. Magnets are of Tungsten steel and carefully fitted to the pole pieces to avoid magnetic losses. In this magneto the current, which is generated in the primary winding of the armature, is conducted to the transformer coil and back through the circuit-breaker, which is located on the front end of the armature shaft in a conventional manner. When this primary circuit is broken by the circuit-breaker, a tension impulse is generated in the secondary winding of the transformer coil, which is conducted through a high-tension lead to the revolving segment of the high-tension distributor of the magneto, located just above the circuit-breaker, and from here it is synchronously distributed to the spark plug. An effort has been made to render the mechanism dust-proof, water-proof and fool-proof. The coil is provided with a kick switch and push button for starting, and provisions are made so that the coil can be placed in the tool box, if desired, and the switch on the dash.

U & H—The U & H master magneto is designed for three, four, six and eight-cylinder motors. It is intended for a single-ignition system, and consists of a permanent field, an armature mounted on annular ball bearings arranged to rotate therein, and a high and low-tension winding on the armature. A circuit-breaking device, known as the interrupter, is located at one end of the armature. Its duty is to interrupt or break the low-tension circuit of the armature which is normally closed, and thereby induce a high-tension impulse in the secondary winding. Mounted on the magneto, and an integral part thereof, is the distributor, which serves to distribute the high-tension current produced to the proper spark plug at the proper time. The general appearance of the U & H magneto is shown in Fig. 25.

The Motor Car Repair Shop

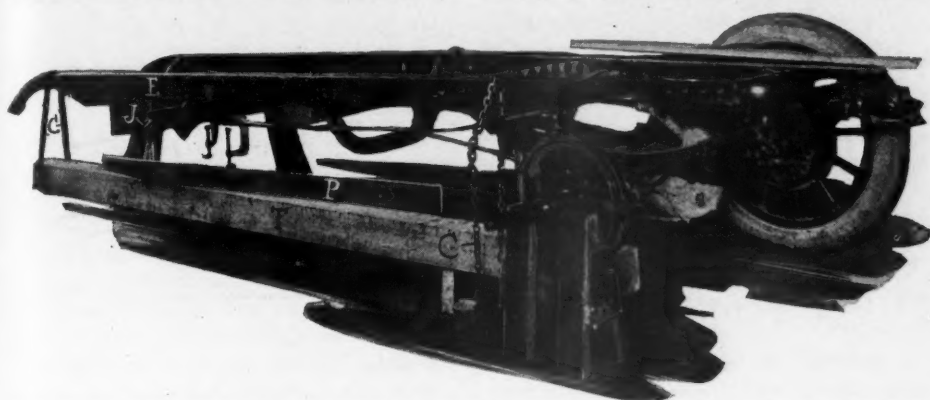


FIG. 1—STRAIGHTENING AND REINFORCING AN INJURED FRAME IN THE STEVENS-DURYEA REPAIRSHOP, CHICAGO

IN Fig. 1 is shown a means employed in a Chicago repairshop of straightening and reinforcing the side members of a motor car frame. The frame shown in the illustration belongs to a car which was nearly wrecked by a collision; so that when the more serious bends had been removed by treatment with heat and hammer, it was decided to reinforce certain portions of it by riveting a steel plate to the inside of both the side members. One of these reinforcement plates is shown at P, resting on the timber T. To straighten the side members, which had been found to sag a little at E, the heavy timber T was suspended beneath the side member by heavy chains C; a jack J then was placed between the timber and the side member of the frame and the side member sprung upward. A little peening with a hammer about the portion E completed the straightening process, the peening causing the metal to take a permanent set in the position in which it was sprung. Peening is the operation of drawing, bending or straightening a piece of metal by blows with the peen of a hammer or sledge. The peen of a hammer is the hemispherical, round-edged, sharp or thin end of the head of a hammer or sledge opposite to the face.

H. Paulman Company's Repairshop

In Fig. 2 is shown the machine tool section of the repair department of H. Paulman & Co., Chicago distributors of Pierce-Arrow cars. For the small amount of space that it occupies, this section is one of the most completely equipped and excellently arranged in the city. It is situated at the rear of the building on the second floor, where the workmen have the advantage of good light and are unmolested by visiting chauffeurs and motorists. On the extreme left of the illustration may be seen parts of three vices, which are arranged at convenient intervals on a work bench that runs along the whole of the rear wall of the building. This bench is well placed, for it is di-

rectly in front of the windows, whose light greatly facilitates the operations of the repairmen and makes for good workmanship. In the background to the left at B is a cylinder grinder, used for re-grinding cylinders after they have become worn from long service. At C is shown a small high-speed lathe used in turning up and fitting small motor car parts; whilst more prominently situated in the foreground is a large lathe L, which is almost continually in use. The forge F is well placed in the darkest and most out-of-the-way corner of the department. A small high-speed drill press is arranged at G; whilst a larger and heavier one is located at H. Between the two drill presses near the partition is a small single-cylinder air pump P, which furnishes

compressed air for the oil-blast cleaning outfit that is employed. Special attention is called to the light but substantial style of motor stands used in this shop. Motor stands in the motor car repairshop are almost indispensable, and many shops have stands of a much heavier construction with pivoted or rocking side rails, that make it possible for one man to turn a motor upside down. To facilitate the turning over of the motor on these stands, a small iron roller is bolted to each leg of the engine crankcase and these rollers rest on the side rails of the stand; four men generally are required to turn a motor over when completely assembled, the operation consisting of lifting one end and at the same time rolling the opposite end toward the opposite ends of the side rails, then letting the raised end down on the opposite ends of the rails on which they rested in the first place.

After a motor has been overhauled in this repairshop, it is run in for a few hours under power other than its own. During this operation all bearings are flooded with oil and all stiffness or possible errors in fitting removed or located and remedied. The means provided for running in the motors is very clearly shown in the foreground at the right of Fig. 2. The motor is mounted on one of the stands on which it was overhauled, and so placed that a belt from a large overhead pulley can transmit power to the flywheel, as illustrated.

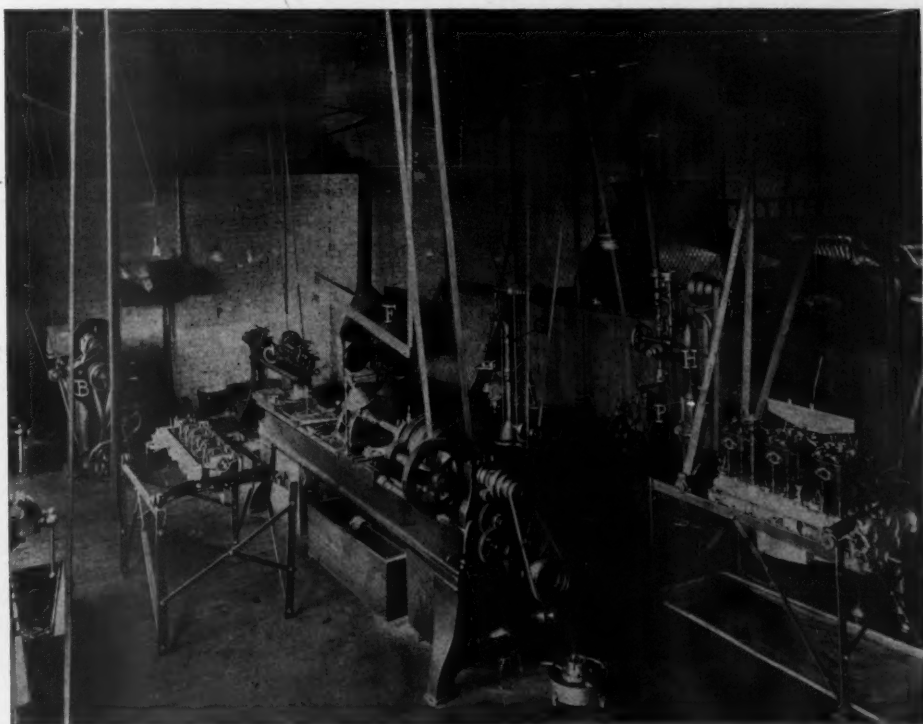


FIG. 2—A VIEW OF H. PAULMAN & CO.'S REPAIRSHOP, CHICAGO, SHOWING MANY INTERESTING FEATURES OF ITS MACHINE TOOL AND REPAIR EQUIPMENT

READING, PA.—The E. S. Youse Co. has succeeded the firm of Youse & Daddow.

Superior, Wis.—The Allan Peck Co. has taken the Superior agency for Chase motor trucks.

Omaha, Neb.—Andrew Murphy & Son have taken the agency for the Detroit electric.

Philadelphia, Pa.—The United Motorist Co. has taken over the garage at 527 Market street.

Syracuse, N. Y.—H. B. Conkling has taken the agency for the Elmore and the agency will be located at 411 Conkling street.

Baltimore, Md.—H. P. Shuler has joined the forces of the Madison Motor Car Co. and will have charge of the Mitchell agency.

Baltimore, Md.—The Shaffer Mfg. Co. is the representative for the new R. C. H. cars for this section, which embraces the entire state.

Denver, Colo.—M. C. Letts, now on the sales force of the Denver branch of the Cadillac Motor Co., will join the International Engineering Corporation.

Baltimore, Md.—The Model Automobile Co. has become the representative for the Pullman car for this district, which embraces Baltimore and the state of Maryland.

Indianapolis, Ind.—E. F. Harris, formerly with the Motor Car Mfg. Co., of Indianapolis, as assistant sales manager, has taken a position with the Henderson sales department.

Minneapolis, Minn.—Milton D. Brice, formerly of the Regal Sales Co., has taken the agency in Minnesota for the Detroit car, as the Brice Auto Co. He will have a building erected at 1402 Hennepin avenue.

Davenport, Ia.—The stock of the Sanders Hardware and Implement Co., agent for the Kisselkar, has been purchased by Andreas Elholm, of Walcott, Ia., who will manage in place of the late Julius Sanders.

Columbus, O.—Al Selbach, a former baseball player, has become secretary and treasurer of the Pausch-Selbach Wagon and Auto Co., at 559 South High street, Columbus, O., agent for Marathon cars and manufacturer of wagons and parts.

Minneapolis, Minn.—Manager E. B. Tozier, of the Diamond Rubber Co. branch in Minneapolis, will open a branch at 126 West Sixth street, St. Paul. The Minneapolis branch will be in its new quarters, Hennepin and Fifteenth streets, March 1.

Pittsburgh, Pa.—The Pittsburgh Chalmers Co. has just concluded negotiations for the purchase of a double lot on the Schenley farms tract, facing Forbes field at a cost approximating \$20,000. A modern concrete and steel garage will be erected at once. The location adjoins that

Brief Business

of the newly established Stearns garage and is at the entrance to Schenley park.

Toledo, O.—The Michigan Buggy Co., of Kalamazoo, Mich., has opened a distributing agency in Toledo.

Omaha, Neb.—George Rogers has taken the agency for the Elmore, having as territory western Iowa, South Dakota and Nebraska.

Indianapolis, Ind.—The Oakland Motor Co., of New Jersey, with offices in this city has changed its name to Oakland Motor Co.

Richmond, Va.—W. P. Forbes, Cole agent, has moved from Tenth and Byrd streets to new salesroom and service department at 1631-5 West Broad street.

Milwaukee, Wis.—The Northwestern Motor Institute has been established in Milwaukee and is located in connection with the Milwaukee Staver branch at 228-232 Wisconsin street.

Peoria, Ill.—R. F. Ford, 817 Main street, Cole agent, has consolidated with E. and B. Starbuck. The concern will be known as the Starbuck Motor Sales Co. It will handle the Cole line.

San Diego, Cal.—Wilson S. Smith & Co., Franklin dealers in this territory, recently enlarged their garage to 50 by 150 feet and have made extensive additions to their equipment.

Moline, Ill.—The Midland Motor Co. has leased quarters at 2009 Michigan avenue, Chicago, as headquarters for the Chicago branch which shortly will be established there. C. G. Wilson will be in charge.

Washington, D. C.—The Regal agency has been transferred from Emerson & Orme to the Hudson Sales Agency, 1012 Fourteenth street. Both pleasure and commercial cars will be handled by the new agency.

Detroit, Mich.—Recent agency appointments for the Havers six are: B. A. & R. Cunningham, Hackensack, N. J.; R. H. & H. C. Gray, Seattle, Wash.; L. P. Strayer, Rock Island, Ill.; M. T. Dill, New Haven, Conn.

Milwaukee, Wis.—The Imperial Auto Sales Co. has been organized by Arthur F. Tiegs and John E. Farber to handle the Imperial, of Jackson, Mich., in Milwaukee and surrounding territory. Salesrooms have been opened at Fourth and Poplar streets.

Milwaukee, Wis.—The Davis Mfg. Co., Fifteenth avenue and Park street, manufacturing motors and engines for pleasure and commercial cars, will build a \$35,000 addition to its plant in the spring. The present plant is only a little more than 3 years old, but has been doubled in size twice. The latest addition will have di-

mensions of 52 by 186 feet, two stories high.

Baltimore, Md.—The B. F. Goodrich Tire Co. is occupying its new store at 110 West Mount Royal avenue.

Louisville, Ky.—C. W. Knight, of Columbus, O., is the new office manager of the Louisville branch of the Diamond Rubber Co.

Louisville, Ky.—The Yager Motor Car Co., agent for the Peerless and Columbus electric, is now located at Second and Hill streets.

Findlay, O.—Collingwood & Edwards have taken the agency of the Hupp-Yeats and it was run out on the street.

Atlanta, Ga.—Dan J. Ligon, for many years with the United States Motor Co.'s Atlanta branch, has been appointed district manager for the Gabrowsky truck.

Detroit, Mich.—New agents appointed to handle the Havers six are as follows: R. H. Ives, Binghamton, N. Y.; E. T. Wood Co., Worcester, Mass.; George McCutcheon, Butte, Mont.

Antigo, Wis.—George Rothenberger & Son, of Echo, Wis., agents for the Ford in Langlade county, will establish a garage and salesroom here. A company is to be organized under the name of Langlade Motor Car Co.

Denver, Colo.—W. W. Barnett, local agent for the Alco and Stoddard-Dayton, has removed several doors east of his old location, and has larger and more convenient sales and repair rooms at 28 West Colfax avenue.

Omaha, Neb.—The recently incorporated Drummond Motor Co., of Omaha, will start work at once on a three-story garage and salesroom at Twenty-sixth and Farnam streets. The building will be of steel and light pressed brick and will cost \$50,000.

Toledo, O.—James Baumgardner and Vernon Kibbey have opened temporary quarters in the rooms occupied by the United garage, at 915 Jefferson avenue, where under the name of the Marathon-Toledo Sales Agency they will handle the Marathon car.

Baltimore, Md.—The Haynes car is now being handled in Baltimore and the state of Maryland by the Haynes Sales Co., of which T. C. Sims is the manager. Mr. Sims has his headquarters for the present with the Lozier Sales Co., Maryland and North avenues.

Milwaukee, Wis.—Paul G. Kuechle has become associated with the Bates-Odenbrett Automobile Co., 503-507 Broadway, Milwaukee, state agent for the White and Abbott-Detroit, taking a financial interest, and will be business manager of the house. Robert G. Bates, president of the

Announcements

motor car company, will now have charge of the selling end.

Milwaukee, Wis.—The Oakland-Wisconsin Motor Co., 215 Wisconsin street, has taken the state agency for the Detroit in Wisconsin.

Lyndonville, Vt.—E. J. Blodgett has just completed arrangements to sell Franklin cars in this territory for the present year.

Hartford, Conn.—G. P. Brainerd has purchased outright the Hartford Motor Car Co. and will continue to push the Cole line under the name of the Brainerd Motor Car Co. in Hartford.

Syracuse, N. Y.—John D. Quinlan, of Jamesville, and E. G. Coe, of this city, have formed a partnership for the exploitation locally of the Schacht pleasure cars and commercial trucks.

Denver, Colo.—J. I. East has become a partner in the McFarland Auto Co., Denver agent for the Packard and Buick. The business henceforth will have the firm name of the McFarland-East Auto Co.

Milwaukee, Wis.—A charter has been granted to the Hydraulic Motor Vehicle Co., of Milwaukee, Wis. The capital stock is \$15,000 and the incorporators are Calvin Stewart, August Baltzer, W. M. Stewart and W. E. Brown.

Denver, Colo.—S. E. Barnwell, formerly of the local Studebaker agency, has taken a position with W. W. Barnett, Alco and Stoddard-Dayton representative. He will act as sales engineer in charge of the truck department.

Seattle, Wash.—The Winton Motor Carriage Co. makes the announcement that branches will be established in both Tacoma and Spokane in the near future. The Tacoma branch will be in charge of H. T. Moody, while the Spokane place will be managed by Robert Bowman.

Boston, Mass.—H. C. Purves, of St. Stephen, N. B., has closed for the agency of the Velie for the province of New Brunswick. Mr. Purves has established Velie service stations in St. Stephen, N. B., and in Calais, Me., which will be the United States headquarters.

Milwaukee, Wis.—The Lozier Motor Sales Co., of Milwaukee, has been purchased by Frank J. Archambault, who has organized the Archambault Motor Sales Co. and will continue the agencies for the Lozier and Michigan cars at 199-201 Ogden avenue, Milwaukee.

Washington, D. C.—The Garford Motor Vehicle Co. has been formed by R. C. Smith, president, and Charles T. Felter, vice-president and treasurer. The new company will handle the Garford line of pleasure and commercial cars and will be located at 829 Fourteenth street. A serv-

ice department will be established in the near future.

Davenport, Ia.—Kunkel Brothers will handle the Everitt. The new firm is using the garage of the Thomas Auto Co.

Reading, Pa.—The Reading Automobile Co. has renewed its arrangement to represent the Franklin in this territory for another season.

Toledo, O.—M. M. Kennedy, of Toledo, has accepted the management of the distributing agency of the White company in this territory.

Baltimore, Md.—The agency for the Stoddard-Dayton car in Carroll county has been placed with W. M. Haines, of Darnestown, Md.

Kansas City, Mo.—The McFarlan Six Sales Co. has contracted for the Alco line of pleasure cars and trucks and the McFarlan six line of pleasure cars for western Missouri and Kansas.

Minneapolis, Minn.—O. H. Gray, of the Kansas City branch of the Studebaker Corporation, has been named in charge of the sales department at the Minneapolis branch, succeeding H. H. Howe, who remains as salesman.

Toledo, O.—The Indiana Invincible Starter Sales Co. has been incorporated at Toledo with a capital stock of \$1,000. Leon Z. Hetzorg and others are back of the concern, which will handle these starters in this territory.

Boston, Mass.—Edward Wells, of Boston, who for 3 years has been connected with the Thomas, both in Buffalo and Boston, has severed his connection with that company. Mr. Wells was assistant sales manager of the Thomas factory prior to his coming to Boston.

Oshkosh, Wis.—The Oshkosh Metal Products Co. has purchased the Knippenberg Mfg. Co., of Oshkosh, together with its equipment, tools, machinery, etc. The company manufactures carbide lamps and other specialties and will now extend its product. C. H. Hartley is president and Fred A. Morse is general manager.

Syracuse, N. Y.—W. H. Downey, formerly manager of the Stoddard-Dayton agency in Philadelphia, has assumed management of the motor car business here of A. M. Zimbrich. Mr. Zimbrich has handled Stoddard-Dayton cars for several years and has now added the Haynes, Standard electric and the Gramm trucks.

Delaware, O.—The Cook Motor Co., of Delaware, O., manufacturer of gasoline motors, held its annual meeting recently at which the following were elected directors: L. L. Denison, W. C. Denison, James Ousey, J. W. Williams, G. Wirt, H. W. Jewell and C. C. Stedman. L. L. Denison was elected president and treas-

urer and C. C. Stedman secretary and general manager.

Washington, D. C.—The Marshall-Parsons Co. has been formed to handle the S. G. V., with salesrooms at 1315 H street.

Chicago—Worley & Terry, Viola, Ill., have arranged with the Cole Motor Co., of Chicago, to handle the Cole.

Seattle, Wash.—P. V. Dowling has recently been appointed manager of the Seattle branch of Hughson & Merton at 924 East Pike street.

Springfield, Mass.—The Shean Automobile Station of this city has closed for the Velie agency for Springfield and the surrounding towns.

Marinette, Wis.—The Marinette Motor Car Co. has taken the district agency for the R. C. H. in a large territory in northeastern Wisconsin.

Phoenix, Ariz.—E. R. Pirtle, of Douglas, Ariz., agent for the Cadillac, has made W. D. Tremaine, of the Tremaine garage, and H. G. Murphy sub-agents for that car in Phoenix and adjacent territory.

Minneapolis, Minn.—E. A. Crosser, several years manager of the White branch, 611 Tenth street S., has gone to Denver to open a branch. C. M. Haviland, assistant manager, succeeds Mr. Crosser.

Milwaukee, Wis.—The Franklin Auto and Supply Co., Fourth and Prairie streets, Milwaukee, state agent for the Franklin and Regal, has been appointed state representative of the Alco pleasure and commercial cars.

Milwaukee, Wis.—The J. C. Cox Co. has been appointed Wisconsin distributor for the Stanley steamer. Salesroom and garage have been opened at 344-346 Sixth street, Milwaukee and W. W. Burgett is in charge as sales manager.

Minneapolis, Minn.—O. A. Ballard has been made manager of the motor car department of the La Crosse Implement Co., which has added a retail motor car department, carrying the Imperial, Deal and Dart cars.

Milwaukee, Wis.—The Milwaukee branch of the Studebaker Corporation of Chicago has been superseded by the George Grede & Brother Co. of 244-250 Reed street, Milwaukee, at which location the E-M-F and Flanders business will be carried on.

Worcester, Mass.—Two more agencies started up in Worcester during the past week, the Peerless through Welch & Suthergren establishing a salesroom at 673 Main street. The other new car is the Palmer-Singer car which will be in charge of Harvey Parker.

Cleveland, O.—The Baker Motor Vehicle Co. has secured the services of William P. Kennedy, electrical engineer, of New York, who will act in the capacity for that company of superintendent of the bureau of service efficiency, the purpose of which is to guide the prospective buyer of motor trucks to the proper solution of

his particular transportation or delivery service problem.

Seattle, Wash.—The Kelly truck is now represented in Seattle by the Pioneer Carriage Co., with R. B. Wiseman as manager.

Louisville, Ky.—The Inter-State Motor Sales Co., local agent for the Inter-State, has moved into its new garage on Second near Walnut street.

San Antonio, Tex.—The Oldsmobile Co., of Texas, has opened salesrooms and an interstate factory branch in this city. C. C. Clark is in charge.

Phoenix, Ariz.—Ferguson, Raub & Co., Arizona agents for the Buick and Apperson, have moved their headquarters from Bisbee to Phoenix. The Bisbee establishment will be maintained as a branch.

Minneapolis, Minn.—E. W. McCreary, manager of the northwestern branch of the B. F. Goodrich Co., has opened a subsidiary agency at 189 West Sixth street, St. Paul, with C. E. Vanatts of the Minneapolis branch as agent.

Moline, Ill.—Frank B. Wood has accepted the position of superintendent of the Midland Motor Co. plant at East Moline. Wood acted as temporary superintendent for a short time, succeeding Henry Pope, who lately resigned.

Dayton, O.—The Marion Automobile Co. of Dayton has closed the following contracts: Caine & Vance, Greenville, O.; Darke county; Bradford Automobile Co., Bradford, O.; Miami county; Model Motor Car Co., Hamilton, O.; Butler and Warren counties.

Detroit, Mich.—A. E. Wood, who was recently chosen to take charge of the new Mitchell-Lewis agency here, has picked E. M. Dill, of the Berry Bros. Varnish Co., as his associate and they have formed the Mitchell-Detroit Sales Co., with quarters at 548-552 Grand River avenue for the present.

Davenport, Ia.—L. M. Barton, treasurer of the Iowa Auto and Tire Co., and manager of the Cedar Rapids branch of the company, has resigned and with L. M. Ford has accepted the district agency of the Detroit. Headquarters will be Cedar Rapids with eastern Iowa and the river counties of Illinois as territory.

Milwaukee, Wis.—The Staver Motor Car Co., of Milwaukee, has been organized by Henry Walter and has established headquarters in the former Kissel garage at 228-232 Wisconsin street. Mr. Walter, who is president and general manager, formerly was owner of the Walter Automobile Co., of Appleton, Wis.

Phoenix, Ariz.—John A. McCondra, formerly with the Pierce-Arrow people in New York and Michigan, has purchased the garage of the Arizona Auto Co. and has reopened it under the firm name of Transcontinental Auto Co. McCondra holds the agency for the Cutting and Cole, which up to this time have not been represented in Arizona, and since his ar-

Recent Incorporations

Troy, O.—Troy Rubber Tire Co., capital stock \$10,000; to manufacture and deal in rubber and metal tires; incorporators, Jacob Sweigart, Cyrus S. Petry, Sherman LeBlond, Charles M. Drake and A. V. Kiser.

Cincinnati, O.—F. B. Williams Co., capital stock \$10,000; general motor car business; incorporators, D. S. Buchanan, Jr., George C. Kuhn, Dwight F. Jerault, F. B. Williams and Samuel Hummel.

Chicago—Union Club Motor Livery, capital stock \$1,000; incorporators, Abram L. Myers, E. A. Zimmerman and E. L. Wellner.

Chicago—American Auto Supply Co., capital stock \$2,500; incorporators B. Payne, W. B. Keefe and W. R. Peacock.

Houston, Tex.—Henderson Cole Motor Co., capital stock \$10,000; incorporators, J. B. Wills, P. L. Wills and J. B. Milam.

Chicago—Hart Motor Car Co., capital stock \$10,000; to manufacture motor cars; incorporators, F. P. Hart, Karl Byington and Charles G. Stohrer.

New York—Automatic Wagon and Truck Co., capital stock \$100,000; incorporators, S. V. Hollings, S. H. McCaw and H. G. Bleakly.

Philadelphia, Pa.—United Motorist Co., capital stock \$125,000; incorporators, William B. MacDonald, M. N. Carroll and Harry D. Bengner.

Burlington, N. J.—Randolph Motor Truck Co., capital stock \$20,000; to manufacture trucks.

Cincinnati, O.—Wilcox-Hoyt Mfg. Co., capital stock \$10,000; to manufacture electrical devices; incorporators, R. A. Wilcox, H. E. Wilcox and F. R. Hoyt.

Hoboken, N. J.—Hudson Motor and Garage Co., capital stock \$50,000; general motor car business; incorporators, C. C. Mollen, R. W. Fulcher and M. Moller.

Cleveland, O.—E. A. Hammer Co., capital stock \$15,000; to manufacture motor cars; incorporators, J. Bushea, J. Miller, C. Murman, W. J. Mahon and E. A. Hammer.

Utica, N. Y.—Utica Auto Supply Co., capital stock \$10,000.

Cincinnati, O.—Kentucky Motor Car Co., capital stock \$20,000; to conduct a garage and general motor car business; incorporators, Paul H. Hesser, Paul L. Bethell and W. R. Allen.

Indianapolis, Ind.—Columbia Taxicab Co., capital stock \$10,000; conduct taxicab business; incorporators, E. C. Hinckle, Walter Wheeler, A. C. Mathias and H. E. Hulsman.

Wheeling, W. Va.—Steenrod Auto Supply Co., capital stock \$25,000; to manufacture and deal in motor vehicles; incorporators, Lewis McC. Steenrod, G. W. Steenrod, A. U. Steenrod and Harry E. Cox.

Washington—Bowles Motor Sales Co., capital stock \$25,000; incorporators, N. S. Powles, I. C. Barber, Charles Kleppmeyer and George W. Bready.

Plaquemine, La.—Plaquemine Motor Car Co., capital stock \$10,000; incorporators, W. A. Holloway and E. B. Schwing.

Bicknell, Ind.—Bicknell Auto Co., capital stock \$15,000; incorporators, E. T. Hollingsworth, S. S. Hollingsworth, J. E. Melth, H. A. Murray, John Carsico, Robert McClure and W. W. Gates.

Columbia, S. C.—R. H. Nesbitt Auto Co., capital stock \$10,000; incorporators, R. H. Nesbitt and W. D. Nesbitt.

St. Louis, Mo.—American Motor Sales Co., capital stock \$5,000; incorporators, C. T. Strauss, F. B. Nulsen and C. W. Waughopall.

Davenport, Ia.—B and B Auto Co., capital stock \$10,000; incorporators, Bert E. Brown and H. L. Burnap.

Minneapolis, Minn.—Minneapolis Electric Motor Co., capital stock \$50,000; incorporators, W. H. Villett, John W. Helm and C. L. Holton.

Milwaukee, Wis.—Hydraulic Motor Vehicle Co., capital stock \$15,000; incorporators, Calvin Stewart, August Baltzer, W. M. Stewart and W. E. Brown.

Tulsa, Okla.—Standard Motor Car Co., capital stock \$5,000; incorporators, W. L. Walker, William S. Baker and Clarence B. Sexton.

Jersey City, N. J.—Webb-Veltch Co., capital stock \$25,000; to manufacture motor cars; incorporators, C. N. King, Jr., G. H. Russell and E. H. Geran.

Boonton, N. J.—Boonton Transportation and Garage Co., capital stock \$125,000; incorporators, F. E. Morse, L. B. Morse and R. Dawson.

Buffalo, N. Y.—Centaur Mfg. Co., capital stock \$35,000; to manufacture motor car appliances; incorporators, A. Schmidt, B. F. Schmidt and J. E. Barry.

Hoboken, N. J.—Hudson Motor and Garage Co., capital stock \$50,000; general motor car business; incorporators, C. C. Moller, R. W. Fulcher and M. Moller.

rival has taken over the agency for the Hupmobile.

Indianapolis, Ind.—The Regal Auto Sales Co., of this city, has filed notice of dissolution.

Syracuse, N. Y.—The J. I. Case Threshing Machine Co. is fitting up a new salesroom at its plant in this city.

Minneapolis, Minn.—The Wallof Motor Truck Co. has bought a site at Red Wing on which it will build a factory.

New York—The Colt-Stratton Co., eastern Cole agent, has arranged a sales agency at Wilkes-Barre, Pa., with W. C. Moore, 48 Pettibone street.

LaCrosse, Wis.—The LaCrosse Plow Co. has been appointed state agent for the Dart delivery cars, in addition to representing the Imperial and Krit.

Philadelphia, Pa.—Plans for a new garage have been filed corner Eighteenth and Market streets. The garage is to be four stories and will cost \$150,000.

Austin, Tex.—The Capital City Auto Co. has been formed here with a capital stock of \$35,000. Its purpose is to sell and repair motor cars. The incorporators are Pierre Bremond, W. M. Graham, Howell J. Grinnan and R. M. Thomson, Jr.

Minneapolis, Minn.—The Power Equipment Co. has taken the Lion line of motor cars for distribution in Minnesota, North and South Dakota, Montana and western Wisconsin. Robert Craig is manager of the new department and S. A. Wilson is salesman.

Syracuse, N. Y.—Manager J. W. Lee, of the Overland-Syracuse Co., announces the establishment of a new service garage at 311 West Willow street. J. W. Lee, of the Overland-Syracuse Co., has become distributor for central New York for Dorian demountable rims.

Detroit, Mich.—Frank J. Burrows has been made purchasing agent for the Briggs-Detroit Co., manufacturer of the new car known as the Detroit. He has been associated with Claude S. Briggs, organizer of the company, for the past 3 years in various enterprises.

Davenport, Ia.—The Scott County Mercantile Co., agent for the Maxwell, has purchased the Buck Auto, Carriage and Implement Co. on West Fourth street in order to make room for the expansion in its motor car business. H. Derrough will be in charge of the motor car department.

Denver, Colo.—The Jackson & Wood Mfg. Co. has been reorganized as the Wood-Wight Mfg. Co., Incorporated, and is located in the quarters formerly occupied by the Hupp branch at 1616-1620 Broadway. The members of the firm are O. E. Wood, Mark Wight and Sidney G. Waller. They will engage in the manufacture of Jackson & Wood electric lights for motor cars, and a self-starter of their own patent which operates either with acetylene or gasoline.